



USER GUIDE

GPS Pathfinder® ProXRT receiver



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GPS Pathfinder® ProXRT receiver

Version 2.00
Revision B
June 2012



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Release Notice

This is the June 2012 release (Revision B) of the *GPS Pathfinder ProXRT Receiver User Guide*. It applies to Model 2 of the GPS Pathfinder ProXRT receiver, and firmware version 4.15.

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Product Limited Warranty

Subject to the terms and conditions set forth herein, Trimble Navigation Limited ("Trimble") warrants that for a period of (1) year from date of purchase this Trimble product (the "Product") will substantially conform to Trimble's publicly available specifications for the Product and that the hardware and any storage media components of the Product will be substantially free from defects in materials and workmanship.

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How to Obtain Warranty Service

To obtain warranty service for the Product, please contact your Trimble dealer. Alternatively, you may contact Trimble to request warranty service at +1-408-481-6940 (24 hours a day) or email your request to trimble_support@trimble.com. Please be prepared to provide:

- your name, address, and telephone numbers;
- proof of purchase;
- a copy of this Trimble warranty
- a description of the nonconforming Product including the model number; and
- an explanation of the problem.

The customer service representative may need additional information from you depending on the nature of the problem.

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This Product limited warranty shall only apply in the event and to the extent that (i) the Product is properly and correctly installed, configured, interfaced, maintained, stored, and operated in accordance with Trimble's applicable operator's manual and specifications, and; (ii) the Product is not modified or misused. This Product limited warranty shall not apply to, and Trimble shall not be responsible for, defects or performance problems resulting from (i) the combination or utilization of the Product with hardware or software products, information, data, systems, interfaces, or devices not made, supplied, or specified by Trimble; (ii) the operation of the Product under any specification other than, or in addition to, Trimble's standard specifications for its products; (iii) the unauthorized installation, modification, or use of the Product; (iv) damage caused by: accident, lightning or other electrical discharge, fresh or salt water immersion or spray (outside of Product specifications); or exposure to environmental conditions for which the Product is not intended; (v) normal wear and tear on consumable parts (e.g., batteries); or (vi) cosmetic damage. Trimble does not warrant or guarantee the results obtained through the use of the Product or Software, or that software components will operate error free.

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Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Trimble's warranty, as set out in the user manual accompanying this statement, or as described in the warranty card accompanying the Product you purchased, is in addition to any mandatory rights and remedies that you may have under the Australian Consumer Law.

Official Language

THE OFFICIAL LANGUAGE OF THESE TERMS AND CONDITIONS IS ENGLISH. IN THE EVENT OF A CONFLICT BETWEEN ENGLISH AND OTHER LANGUAGE VERSIONS, THE ENGLISH LANGUAGE SHALL CONTROL.

Notices

Class B Statement – Notice to Users. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules and Part 90. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

Canada

This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

This apparatus complies with Canadian RSS-GEN, RSS-310, and RSS-210.

Cet appareil est conforme à la norme CNR-GEN, CNR-310, et CNR-210 du Canada.

Europe

This product is intended to be used in all EU member countries, Norway, and Switzerland.

This product has been tested and found to comply with the requirements for a Class B device pursuant to European Council Directive 89/336/EEC on EMC, thereby satisfying the requirements for CE Marking and sale within the European Economic Area (EEA). Contains Bluetooth radio module PBA 31308. These requirements are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential or commercial environment.



Australia and New Zealand

This product conforms with the regulatory requirements of the Australian Communications and Media Authority (ACMA) EMC framework, thus satisfying the requirements for C-Tick Marking and sale within Australia and New Zealand.



Taiwan – Battery Recycling Requirements

The product contains a removable Lithium-ion battery. Taiwanese regulations require that waste batteries be recycled.



廢電池請回收

Notice to Our European Union Customers

Directive 1999/5/EC

Hereby, Trimble Navigation, declares that the GPS Pathfinder ProXRT receiver is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Restriction of Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)

This Trimble product complies in all material respects with DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive) and Amendment 2005/618/EC filed under C(2005) 3143, with exemptions for lead in solder pursuant to Paragraph 7 of the Annex to the RoHS Directive applied.

For China RoHS information, see [Appendix B, China RoHS Information](#) on page 99.

Waste Electrical and Electronic Equipment (WEEE)

For product recycling instructions and more information, please go to www.trimble.com/ev.shtml.

Recycling in Europe: To recycle Trimble WEEE (Waste Electrical and Electronic Equipment, products that run on electrical power.), Call +31 497 53 24 30, and ask for the "WEEE Associate". Or, mail a request for recycling instructions to:

Trimble Europe BV
c/o Menlo Worldwide Logistics
Meerheide 45
5521 DZ Eersel, NL



Declaration of Conformity

We, Trimble Navigation Limited,

935 Stewart Drive
PO Box 3642
Sunnyvale, CA 94088-3642
United States
+1-408-481-8000

declare under sole responsibility that the product:
GPS Pathfinder ProXRT receiver
comply with Part 15 of FCC Rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Safety Information

Before you use the Trimble® GPS Pathfinder® ProXRT receiver, make sure that you have read and understood all safety requirements.

Regulations and safety

The receiver contains an internal Bluetooth® radio and can send signals through Bluetooth wireless technology. Bluetooth radios operate in license-free bands.

Before operating a GPS Pathfinder ProXRT receiver, determine if authorization or a license to operate the unit is required in your country. It is the responsibility of the end user to obtain an operator's permit or license for the receiver for the location or country of use.

For FCC regulations, see [Notices, page 4](#).

Type approval

Type approval, or acceptance, covers technical parameters of the equipment related to emissions that can cause interference. Type approval is granted to the manufacturer of the transmission equipment, independent from the operation or licensing of the units. Some countries have unique technical requirements for operation in particular radio-modem frequency bands. To comply with those requirements, Trimble may have modified your equipment to be granted Type approval. Unauthorized modification of the units voids the Type approval, the warranty, and the operational license of the equipment.

Exposure to radio frequency radiation

The radiated output power of the internal Bluetooth wireless radio is far below the FCC radio frequency exposure limits. Nevertheless, the wireless radio should be used in such a manner that the Trimble receiver is 20 cm or further from the human body. The internal wireless radio operates within guidelines found in radio frequency safety standards and recommendations, which reflect the consensus of the scientific community. Trimble therefore believes that the internal wireless radio is safe for use. The level of energy emitted is far less than the electromagnetic energy emitted by wireless devices such as cellular phones. However, the use of wireless radios may be restricted in some situations or environments, such as on aircraft. If you are unsure of restrictions, you are encouraged to ask for authorization before turning on the wireless radio.

AC adaptor safety



WARNING – To use AC adaptors safely:

- Use only the AC adaptor intended for the GPS Pathfinder ProXRT receiver. Using any other AC adaptor can damage the receiver and may void your warranty. Do not use the AC adaptor with any other product.
 - Make certain that the input voltage on the adaptor matches the voltage and frequency in your location.
 - Make certain that the adaptor has prongs compatible with your outlets.
 - Do not use the AC adaptor in wet outdoor areas; it is designed for indoor use only.
 - Unplug the AC adaptor from power when not in use.
 - Do not short the output connector.
 - Be aware that there are no user-serviceable parts in this product.
 - If the AC adaptor becomes damaged, replace it with a new Trimble AC adaptor.
-

Battery safety



WARNING – Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion or fire, and can result in personal injury and/or property damage. To prevent injury or damage:

- Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to, discoloration, warping, and leaking battery fluid.
 - Do not expose the battery to fire, high temperature, or direct sunlight.
 - Do not immerse the battery in water.
 - Do not use or store the battery inside a vehicle during hot weather.
 - Do not drop or puncture the battery.
 - Do not open the battery or short-circuit its contacts.
-



WARNING – Avoid contact with the rechargeable Lithium-ion battery if it appears to be leaking. Battery fluid is corrosive, and contact with it can result in personal injury and/or property damage.

To prevent injury or damage:

- If the battery leaks, avoid contact with the battery fluid.
 - If battery fluid gets into your eyes, immediately rinse your eyes with clean water and seek medical attention. Do not rub your eyes!
 - If battery fluid gets onto your skin or clothing, immediately use clean water to wash off the battery fluid.
-



WARNING – Charge and use the rechargeable Lithium-ion battery only in strict accordance with the instructions. Charging or using the battery in unauthorized equipment can cause an explosion or fire, and can result in personal injury and/or equipment damage.

To prevent injury or damage:

- Do not charge or use the battery if it appears to be damaged or leaking.
 - Charge the Lithium-ion battery only in a Trimble product that is specified to charge it. Be sure to follow all instructions that are provided with the battery charger.
 - Discontinue charging a battery that gives off extreme heat or a burning odor.
 - Use the battery only in Trimble equipment that is specified to use it.
 - Use the battery only for its intended use and according to the instructions in the product documentation.
-

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Introduction

In this chapter:

- About the GPS Pathfinder ProXRT receiver
- What's in the box?
- Accessories
- Supported GNSS field software
- Use and care
- COCOM limits
- Technical support

Welcome to the *GPS Pathfinder ProXRT Receiver User Guide*. This guide describes how to set up and use the Trimble® GPS Pathfinder® ProXRT receiver.

This guide applies to Model 2 of the GPS Pathfinder ProXRT receiver.

Even if you have used other GNSS (Global Navigation Satellite System) products before, Trimble recommends that you spend some time reading this manual to learn more about the special features of this product. If you are not familiar with GNSS, go to the Trimble website (www.trimble.com) for an interactive look at Trimble and GNSS.

About the GPS Pathfinder ProXRT receiver

The Trimble GPS Pathfinder ProXRT receiver is a high-accuracy GNSS receiver that uses H-Star™ technology for decimeter and subfoot real-time or postprocessed accuracy. The receiver is a dual-frequency receiver, that tracks both L1 and L2 GPS signals, and optionally L1 and L2 GLONASS signals.

The receiver can also optionally output NMEA-0183 messages.

The receiver is also capable of tracking the Galileo GIOVE-A and GIOVE-B test satellites for signal evaluation and test purposes, through the Web Browser interface available with the NMEA optional upgrade. For more information on the Galileo satellites, see the [GPS Pathfinder ProXRT Customer FAQs](#).

Ideal for all GIS data collection and maintenance projects, the receiver provides a range of options for high-accuracy positioning in real time. This enables you to collect and update precise data for utility, urban, and natural resource databases.

The main features of the GPS Pathfinder ProXRT receiver are:

- Decimeter and subfoot accuracy in real time, or after postprocessing, using H-Star technology
- Support for decimeter, subfoot, and submeter accuracy in real time using OmniSTAR HP, XP, and VBS services, respectively
- Optional GLONASS signal support

If you purchase the Upgrade to GLONASS option, the receiver can track satellites that are part of the GLONASS system (GLObal NAVigation Satellite System). Tracking GLONASS satellites as well as GPS satellites can improve productivity by reducing the time required to achieve real-time decimeter or subfoot solutions and increasing the amount of data collected, particularly in tough environments such as around tall buildings and under heavy tree canopy.

For more information about the Upgrade to GLONASS option, see [Tracking GLONASS satellites, page 60](#).

- Bluetooth wireless technology

The receiver has integrated Bluetooth wireless technology for cable-free configuration and operation with a field computer on a range pole. In addition, you can connect a Bluetooth-enabled external radio or cellular phone to access real-time corrections from an external radio or the Internet.

Note – Trimble recommends that you use a cabled connection to the field computer when using the ProXRT receiver in a backpack, and a Bluetooth wireless connection when the field computer and the ProXRT receiver are both pole-mounted.

- Internal all-day battery

The receiver has a long-life integrated battery, which typically provides 13 hours of power between charges.

- Optional NMEA-0183 message output

If you purchase the NMEA-0183 message output option, the receiver can output NMEA data for use with third-party software or devices. The desired NMEA output messages can be selected using the receiver's Web Browser Interface, which is also activated when this option is installed.

The Web Browser Interface also enables you to view the tracked Galileo GIOVE-A and GIOVE-B test satellites for signal evaluation and test purposes.

For more information about the Web Browser Interface, see [Configuring the Receiver Using the Web Browser Interface](#).

For more information on configuring the NMEA-0183 output options, refer to the [I/O Configuration menu](#) section.

What's in the box?

When you receive the GPS Pathfinder ProXRT receiver, check that you have received all the components, as shown in [Figure 1.1](#).

The standard components are shown below.



Figure 1.1 GPS Pathfinder ProXRT receiver components

Inspect all contents for visible damage (scratches or dents). If any components appear damaged, notify the shipping carrier. Keep the shipping and packaging material for the carrier's inspection.

Accessories

The following optional accessories are available:

- Backpack
- Range pole
- Range pole bracket
- Vehicle magnetic mount
- Upgrade to GLONASS option (software)
- Upgrade to NMEA option (software)

For more information, go to the Trimble website at www.trimble.com.

Supported GNSS field software

You can use the ProXRT receiver with the following Trimble Mapping and GIS field software:

- TerraSync™ software
- ESRI ArcPad software with the Trimble GPSCorrect™ extension for ArcPad
- Any application developed using the GPS Pathfinder Tools Software Development Kit (SDK)

For software versions, see the [GPS Pathfinder ProXRT Customer FAQs](#).

Note – *If you purchase the optional NMEA upgrade, the ProXRT receiver can be used with software—other than that described—which supports NMEA message format. Otherwise the receiver does not operate with other software.*



WARNING – Some firmware versions only support certain software versions. If the firmware version installed on the receiver does not support the software versions, you will not be able to connect to the receiver.

Once an updated firmware has been uploaded onto the receiver, you will not be able to revert to a previous version.

For more information, see the [GPS Pathfinder ProXRT Customer FAQs](#) or contact your local Trimble representative.

Use and care

This receiver can withstand normal usage outdoors. However, Trimble recommends that, wherever possible, all GNSS receiver equipment is protected from rain or water. Keeping the receiver dry prolongs the life of the equipment and reduces the effects of corrosion on ports and connectors. If the equipment gets wet, use a clean dry cloth to dry the equipment and then leave the equipment open to the air to dry. Do not lock wet equipment in a transport case for prolonged periods. Wherever possible, avoid exposing the GNSS receiver to corrosive liquids and salt water.



CAUTION – Operating or storing the receiver outside the specified temperature range can damage it. For more information, see [Batteries and power, page 20](#).

COCOM limits

The U.S. Department of Commerce requires that all exportable GNSS products contain performance limitations so that they cannot be used in a manner that could threaten the security of the United States. The following limitations are implemented on this product:

- Immediate access to satellite measurements and navigation results is disabled when the receiver velocity is computed to be greater than 1,000 knots, or its altitude is computed to be above 18,000 meters. The receiver GNSS subsystem resets until the COCOM situation clears. As a result, all logging and stream configurations stop until the GNSS subsystem is cleared.

Technical support

Go to the GPS Pathfinder ProXRT receiver technical support page (www.trimble.com/pathfinderproxrt_ts.asp) on the Trimble website for the latest support information about the receiver, including:

- FAQs
- support notes detailing the latest support issues
- documentation
- the latest files available for download

Getting Started

In this chapter:

- Batteries and power
- Keypad and display
- Rear connectors
- Receiver operation overview

This chapter provides the information you need to get up and running with the GPS Pathfinder ProXRT receiver.

Batteries and power

The GPS Pathfinder ProXRT receiver uses an internal rechargeable Lithium-ion battery, which can be replaced only at an authorized Trimble Service Center.

The receiver can also be powered by an external power source that is connected to the Lemo or modem port.

The operational time provided by the internal battery depends on the type of measurement and operating conditions. Typically, the internal battery provides 13 hours of operation time.

Note – All battery operation tests are carried out with new, fully charged batteries at room temperature and full receiver configuration operational. Older batteries, at temperatures significantly higher or lower than room temperature, will have a reduced performance.

External power

The receiver uses an external power source in preference to its internal batteries. If the receiver is not connected to an external power source, or if the external power supply fails, the internal batteries are used.

Note – The life of the battery can be significantly shortened if power is constantly supplied to the receiver. To avoid this issue, connect the receiver to an external power source only when the battery requires charging. Once fully charged, disconnect the external power source and allow the battery to discharge through normal use.

Battery safety

The receiver is powered by a rechargeable internal Lithium-ion battery. Charge and use the battery only in strict accordance with the instructions below.



WARNING – Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion or fire, and can result in personal injury and/or property damage. To prevent injury or damage:

- Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to, discoloration, warping, and leaking battery fluid.
 - Do not expose the battery to fire, high temperature, or direct sunlight.
 - Do not immerse the battery in water.
 - Do not use or store the battery inside a vehicle during hot weather.
 - Do not drop or puncture the battery.
 - Do not open the battery or short-circuit its contacts.
-



WARNING – Avoid contact with the rechargeable Lithium-ion battery if it appears to be leaking. Battery fluid is corrosive, and contact with it can result in personal injury and/or property damage.

To prevent injury or damage:

- If the battery leaks, avoid contact with the battery fluid.
 - If battery fluid gets into your eyes, immediately rinse your eyes with clean water and seek medical attention. Do not rub your eyes!
 - If battery fluid gets onto your skin or clothing, immediately use clean water to wash off the battery fluid.
-

Battery performance

To optimize battery performance and extend battery life:

- Fully charge all new batteries before use.
- Batteries perform best when they are not used at extreme temperatures. The receiver is designed to operate at -40°C to $+65^{\circ}\text{C}$ (-40°F to $+149^{\circ}\text{F}$). However, operation at temperatures of less than 0°C (32°F) can cause a rapid drop in operating time.
- The Lithium-ion batteries are rated to operate from -20°C to $+48^{\circ}\text{C}$ (-4°F to $+118^{\circ}\text{F}$).
- Do not allow a battery that is in storage to discharge to below 5 V.

Note – The supported GNSS field software does not turn on or turn off the GPS Pathfinder ProXRT receiver when connecting or disconnecting to the receiver. Remember to turn off the receiver to save battery power when you disconnect from the receiver or close the GNSS field software.

Charging the Lithium-ion battery

The rechargeable Lithium-ion battery is supplied partially charged. Charge the battery completely before using it for the first time. If the battery has been stored for longer than three months, charge it before use.

The internal battery charges fully in 8 hours when connected to a suitable power source.



WARNING – To use AC adaptors safely:

- Use only the AC adaptor intended for the GPS Pathfinder ProXRT receiver. Using any other AC adaptor can damage the receiver and may void your warranty. Do not use the AC adaptor with any other product.
- Make certain that the input voltage on the adaptor matches the voltage and frequency in your location.
- Make certain that the adaptor has prongs compatible with your outlets.
- Do not use the AC adaptor in wet outdoor areas; it is designed for indoor use only.
- Unplug the AC adaptor from power when not in use.
- Do not short the output connector.
- Be aware that there are no user-serviceable parts in this product.
- If the AC adaptor becomes damaged, replace it with a new Trimble AC adaptor.



WARNING – Charge and use the rechargeable Lithium-ion battery only in strict accordance with the instructions. Charging or using the battery in unauthorized equipment can cause an explosion or fire, and can result in personal injury and/or equipment damage.

To prevent injury or damage:

- Do not charge or use the battery if it appears to be damaged or leaking.
- Charge the Lithium-ion battery only with a Trimble product that is specified to charge it. Be sure to follow all instructions that are provided with the battery charger.
- Discontinue charging a battery that gives off extreme heat or a burning odor.

- Use the battery only in Trimble equipment that is specified to use it.
 - Use the battery only for its intended use and according to the instructions in the product documentation.
-

To charge the battery:

1. Connect one end of the multiport adaptor to the 26-pin plug on the receiver.
2. Connect the other end of the multiport adaptor to the AC adaptor.
3. Connect the AC adaptor to an AC power outlet. An international adaptor kit is provided with the receiver.



When the internal temperature of the receiver is greater than 50 °C (122 °F) or less than 5 °C (41 °F), the internal battery charger stops charging and the receiver's display shows **Charger Disabled, Temp Limited**. However, the receiver still draws its power from the external DC source, extending the operating time in the field.

When the external DC voltage is not able to support the power drain, an **X** is displayed across the battery status icon on the front panel display, which indicates that the internal charger is off.

Storing the Lithium-ion battery

If you must store a Lithium-ion battery for long periods, make sure that it is fully charged before it is stored, and that you charge it at least once every three months while it is stored.

Do not allow a battery that is in storage to discharge to below 5 V. A battery that reaches **deep discharge** level (5 V or less) cannot be recharged and must be replaced. (To protect a battery that is in use from deep discharge, the receiver switches power sources or stops drawing power when the battery pack discharges to 5.9 V.)

All batteries discharge over time when not in use, and they discharge faster in colder temperatures. Do not store the receiver at temperatures outside the range -40°C to $+70^{\circ}\text{C}$ (-40°F to $+158^{\circ}\text{F}$).

The internal battery will only charge from an external power source as long as that source can support the power drain, for example, an AC power adaptor. The receiver is supplied with a mains power supply unit that recharges the battery inside the receiver when it is connected through the adaptor to the modem port.

Removing the rechargeable Lithium-ion battery

The internal Lithium-ion battery should be removed only at an authorized Trimble Service Center. If the battery is removed at an unauthorized service center, the remaining warranty on the product is void.

Keypad and display

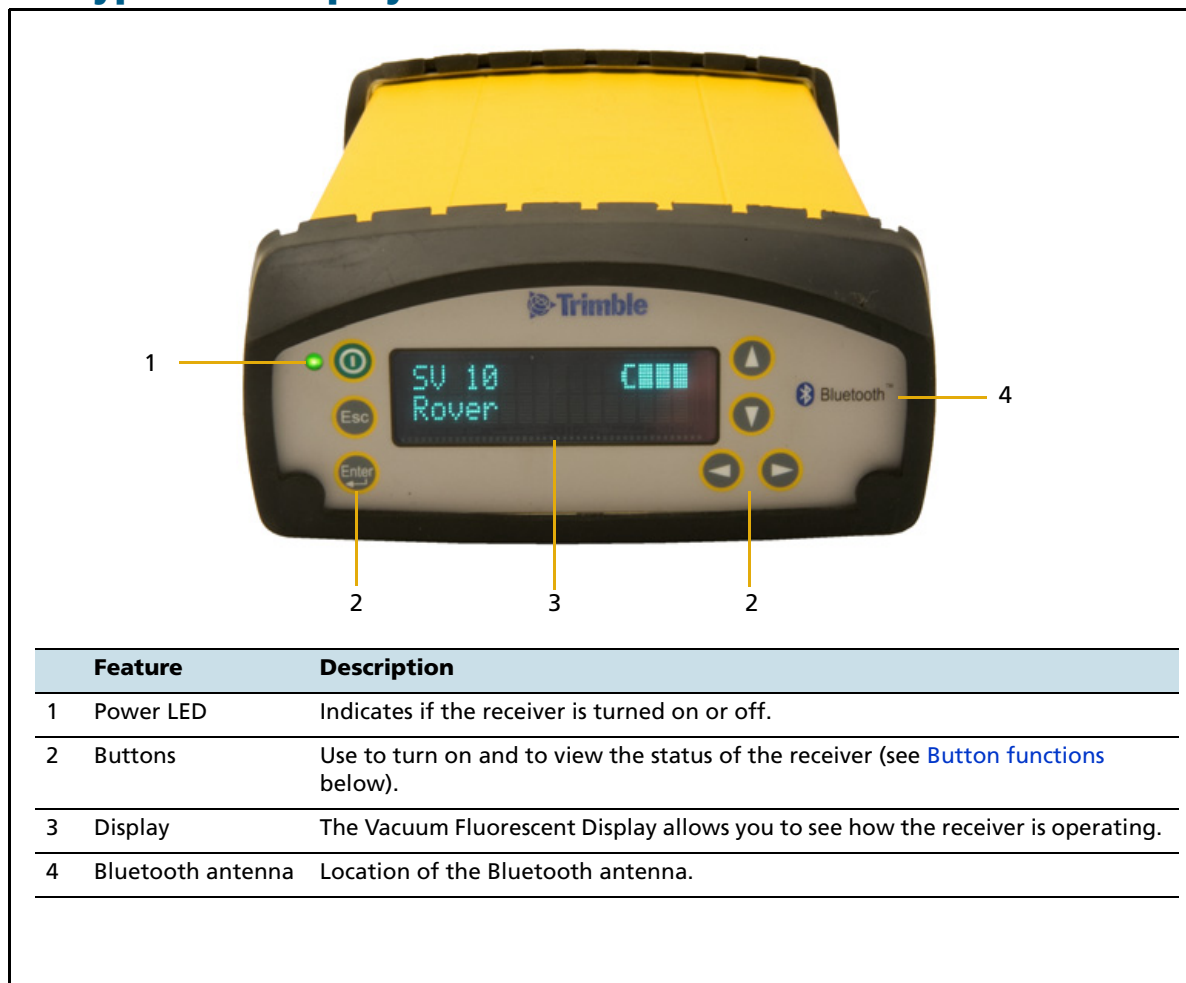


Figure 2.1 Front view of the receiver

Button functions

Use the buttons on the front panel to turn on and turn off the receiver and to check the receiver settings.



CAUTION – Do not use the front panel of the GPS Pathfinder ProXRT receiver to configure the receiver settings. Any settings you configure are reset the next time you connect to the receiver from the GNSS field software, and using the front panel to reconfigure settings during data collection may cause problems with your data. To avoid problems, always configure the receiver using the GNSS field software. For more information, see [Chapter 4, Configuring the GNSS receiver](#).

Button	Name	Function
	Power	Turns the receiver on and off. See Power button operations below.
	Escape	Returns to the previous screen.
	Enter	Advances to the next screen.
	Up	Moves the cursor between multiple fields on a screen.
	Down	Moves the cursor between multiple fields on a screen.
	Left	Moves the cursor between characters.
	Right	Moves the cursor between characters.

Power button operations

Press the Power button  to turn on and turn off the receiver. In addition, tap  to return to the Home screen, or hold down  to perform the following operations:

To...	Hold the  button for...	Notes
turn off the receiver (soft reset)	two seconds	The display shows a countdown timer. When the display goes blank, release the Power button.
clear the almanac, ephemeris, and satellite information	15 seconds	The display shows a countdown timer. When the display goes blank, continue to hold the Power button. The display shows a countdown time to clear the almanac and ephemeris. When the counter reaches 0, release the Power button.
reset the receiver to the factory default settings	30 seconds	The display shows a countdown to turn off the receiver, another countdown to clear the almanac and ephemeris and then shows a third countdown time to reset the receiver (Formatting FS). When this counter reaches 0, release the Power button.
force the receiver to turn off	at least 60 seconds	If the reset method above does not work, use this method to force the receiver to turn off. When the front panel turns off and you have held the Power button for at least 60 seconds, release the Power button and the Power LED will go off.

Home screen

The Home screen is the main screen displayed on the receiver. To get back to the Home screen from any other screen, tap the Power button .

The Home screen shows the following information:

- Number of satellites being tracked:
 - The number of satellites used to calculate the position.
 - If the receiver is set to use SBAS or OmniSTAR corrections, the Home screen displays the number of satellites for which corrections have been received.
 - If the receiver is computing an autonomous solution, the Home screen displays all satellites in view, that is, all satellites above the elevation mask.
- Internal battery power remaining
- Current mode configuration

Status screens

The receiver has several view-only status screens that allow you to review the current settings of the receiver. The status screens provide the following information:

- Position solution and horizontal and vertical precision
- CMR and RTCM IDs, or OmniSTAR satellite and link status
- Base name and code, or OmniSTAR mode and subscription expiry
- Latitude, longitude, and height
- Antenna height
- Receiver model
- Receiver firmware version
- Receiver hardware version
- Receiver serial number
- Receiver MAC and IP address for use with the Web Browser Interface if the NMEA option is enabled

To access these screens from the Home screen, press  or .

Note – Depending on the settings in the GNSS field software, some of the status values displayed on the front screen may differ slightly from that shown in the GNSS field software.

Rear connectors

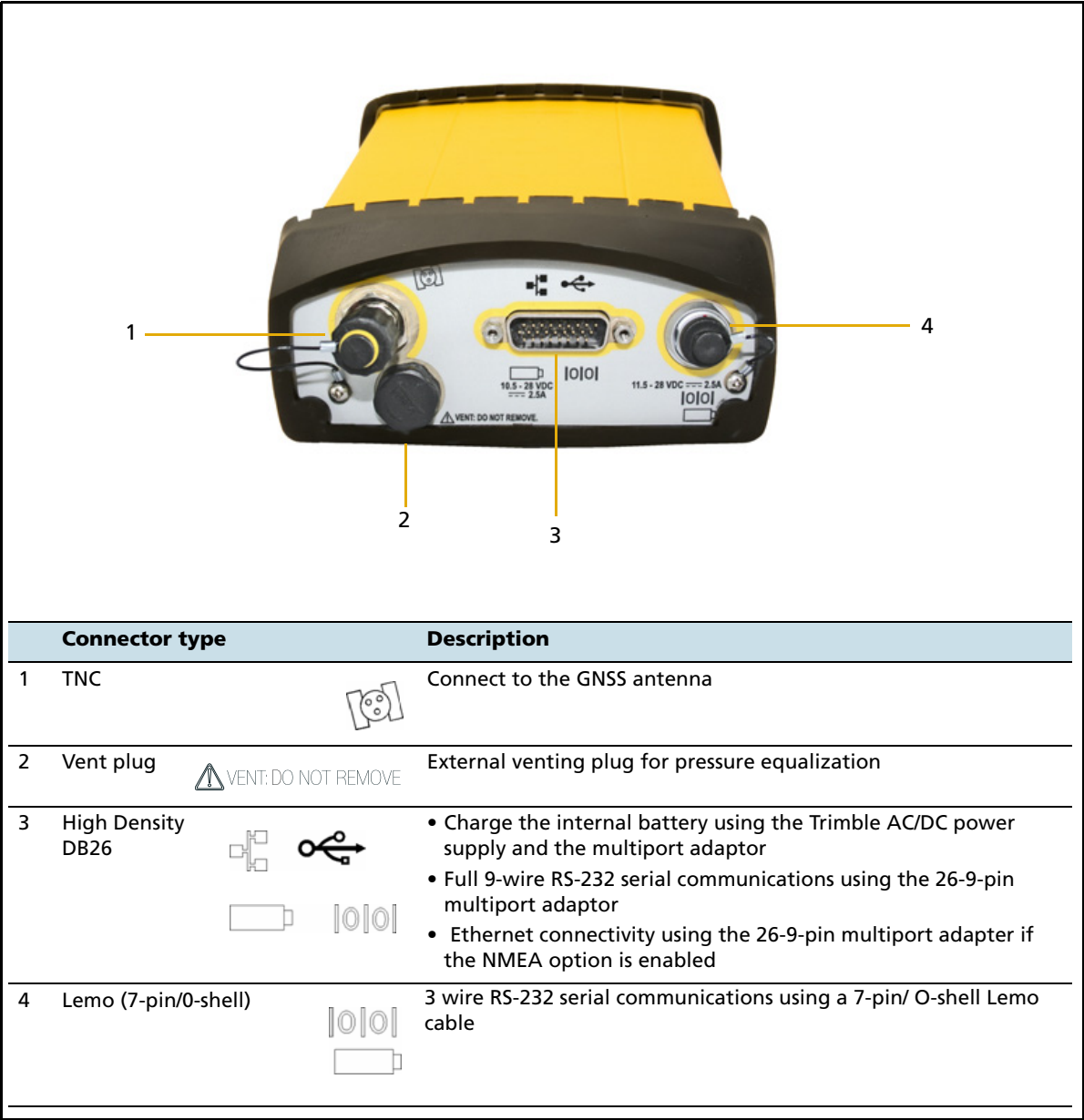


Figure 2.2 Rear view of the ProXRT receiver

Receiver operation overview

To collect data in the field using the receiver, you need the following components:

- GPS Pathfinder ProXRT receiver
- GNSS antenna and antenna cable
- Selected mounting accessories, such as range pole and bracket, backpack, or vehicle magnetic mount
- Field computer running supported GNSS field software
- External devices—required when connecting to an external real-time differential correction source, such as a cellular phone, external data radio, or GeoBeacon receiver

The GPS Pathfinder ProXRT receiver incorporates the GNSS receiver and power supply into a single unit. In most applications, the receiver operates entirely from its own integrated battery unit. However, on a vehicle you can use an external power supply; the internal battery then acts as a backup power supply, covering any external power failures.

The GNSS antenna is separate from the receiver. To receive GNSS positions, you must connect the receiver to the Tornado antenna. To ensure maximum performance, mount the antenna so that it is clear of obstructions, such as on a range pole, on a backpack, or on a vehicle roof.

Connect the receiver to a field computer running supported GNSS field software. Use the GNSS field software to configure the receiver and to collect data.

The receiver can be connected to a source of real-time corrections such as a virtual reference station system. The connection is provided through an external cellular phone or an external radio that is connected to the receiver either by Bluetooth wireless technology or by means of a cable. Configure the Trimble GNSS field software to use the real-time corrections received from the external correction source.

The correction stream from an SBAS (WAAS/EGNOS/MSAS) or an OmniSTAR service is broadcast through geostationary satellites, and detected by the GNSS antenna itself. No external radio or base station is required. Configure the GNSS field software to use the real-time corrections received from the SBAS or OmniSTAR service.

Note – To receive OmniSTAR corrections, you must purchase a subscription to an OmniSTAR service. For more information, see [Using OmniSTAR real-time corrections, page 53](#).

Connecting to Other Equipment

In this chapter:

- [Mounting the receiver](#)
- [Connecting to a field computer](#)
- [Connecting to an external differential correction source](#)

This chapter explains how to mount the receiver on a range pole or backpack, and how to connect the receiver to external equipment, including a field computer and external real-time differential correction sources.

The chapter covers connections using cables or Bluetooth wireless technology.

Mounting the receiver

Mounting the receiver on a range pole

1. Attach the two range pole mounting brackets to the pole.
2. Tighten the top bracket, making sure that it is at a convenient height for the receiver.
3. Place the GPS Pathfinder ProXRT receiver in the slot in the pole bracket, and then secure it with the tripod clip.
4. Move the lower pole bracket down until it is over the second tripod clip on the receiver and then tighten the pole bracket onto the pole. The receiver is held in place between the two brackets.



5. Insert the field computer into the field computer bracket.
6. Use the 5/8" thread to attach the GNSS antenna to the top of the pole.
7. Use the GNSS antenna cable to connect the GNSS antenna to the receiver.

Carrying the receiver in a backpack

If you prefer to work free of the weight of the receiver on a pole, you can carry it in a backpack, with the antenna mounted on the backpack pole. If you carry the receiver in a backpack and are using an external radio, use an external radio antenna mount for optimal radio signal reception, and use a cabled connection between the receiver and the field computer.

Mounting the receiver on a vehicle magnetic mount

1. Attach the magnetic mount screwthread adaptor to the GNSS antenna.
2. Attach the GNSS antenna to the roof of the vehicle.
3. Run the GNSS antenna cable for the receiver into the vehicle either through a rubber grommet in the roof, or through the passenger door window, which must be left slightly open during operation.
4. Place and secure the GPS Pathfinder ProXRT receiver and the field computer in a convenient location in the vehicle.
5. Use a cable or Bluetooth wireless technology to connect the receiver to the field computer. For more information, see [Connecting to a field computer](#) below.

Connecting to a field computer

You can operate a GPS Pathfinder ProXRT receiver with a field computer (such as a handheld device, a Tablet PC, or a laptop) that is running supported GNSS field software. For a list of supported GNSS field software, see [page 50](#).

Typically, the receiver and the field computer operate from their own individual power sources.

Note – *The supported GNSS field software does not turn on or turn off the receiver when connecting or disconnecting to the receiver. Remember to turn off the receiver to save battery power when you disconnect from the receiver or close the GNSS field software.*

You can connect the field computer to the receiver using Bluetooth wireless technology, or using the cables provided with the receiver.

Note – *Trimble recommends that you use a cabled connection to the field computer when using the ProXRT receiver in a backpack, and a Bluetooth wireless connection when the field computer and the ProXRT receiver are both pole-mounted.*

Note – *The rest of this section assumes that the field computer you are using is powered by the Windows Mobile® operating system.*

Connecting the field computer using Bluetooth wireless technology

Bluetooth wireless technology is an industry standard specification that eliminates the need for cables between Bluetooth-enabled devices.

The GPS Pathfinder ProXRT receiver's integrated Bluetooth radio is always on and discoverable. This means that when you turn on the receiver, it can always be detected by other devices when they scan.



To connect a field computer to the receiver using Bluetooth wireless technology, you must:

1. Connect the field computer to the receiver.
2. Configure the COM port on the field computer to use for the connection.
3. Configure the GNSS field software to connect to the receiver.

Step 1: Connecting the field computer to the receiver

1. Connect one end of the antenna cable to the TNC connector on the rear of the receiver, and the other end of the cable to the antenna.
2. Turn on the receiver.
3. Make sure that the Bluetooth radio in the field computer is turned on; tap  / *Settings / Connections / Wireless Manager*.
4. On the field computer, tap  / *Settings / Connections / Bluetooth*.

5. In the *Devices* tab, tap *Add new device* or *New Partnership*.

The field computer searches for other Bluetooth devices and displays them in the list.

6. From the list of available devices, select the GPS Pathfinder ProXRT receiver and then tap **Next** on the right softkey.

The *Enter Passcode* screen appears.

7. Tap **Next** without entering a passcode.
8. If prompted to add the device to your device list, tap **No**.

The *Partnership Settings* screen appears.

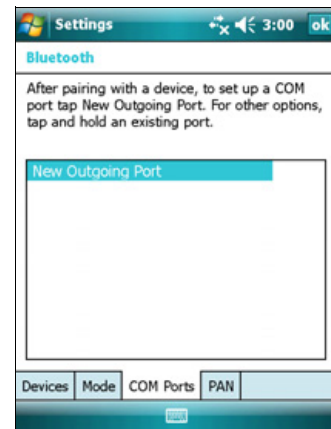
9. If required, change the name of the device in the *Display Name* field.
10. Select the **Serial Port** check box. Depending on the Windows Mobile operating system version, this may appear automatically, or you may need to select the **Advanced** right softkey, or tap the connected GNSS receiver again. Then tap **Save** or **Finish** on the right softkey.
11. Tap **OK** in the top right corner of the screen to close the Bluetooth application.
12. Tap  in the top right corner to close the *Settings* screen.

You have now created a partnership between the field computer and the other Bluetooth-enabled device so that they can communicate.



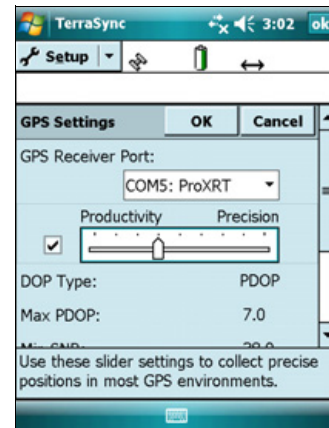
Step 2: Configuring the COM port to use on the field computer

1. On the field computer, tap  / *Settings* / *Connections* / *Bluetooth*.
2. Tap the *COM Ports* tab.
3. Tap *New Outgoing Port*.
4. Select the GPS Pathfinder ProXRT receiver and then tap **Next** on the right softkey.
5. Select the COM port on the field computer to use for the connection.
6. **Clear** the *Secure Connection* check box.
7. Tap **Finish** on the right softkey.
8. Tap **OK** in the top right corner to close the Bluetooth application.
9. Tap  in the top right corner to close the *Settings* screen.



Step 3: Configuring the GNSS field software to connect to the receiver

1. On the field computer, start the GNSS field software and then open the *Setup* section.
2. Tap **GPS Settings**. The *GPS Settings* form appears.
3. From the *GPS Receiver Port* field, select the COM port that you selected for the Bluetooth wireless connection.
4. Tap **OK** to close the *GPS Settings* form.
5. To connect the software to the receiver, tap **GPS** at the top of the main screen of the Setup section.



Reconnecting the field computer to the receiver

To reconnect the field computer to the receiver at any time:

1. Turn on the receiver.
2. Turn on the Bluetooth radio in the field computer.
3. On the field computer, start the GNSS field software and make sure that the correct COM port is selected in the *GPS Receiver Port* field.
4. Tap the **GPS** button.

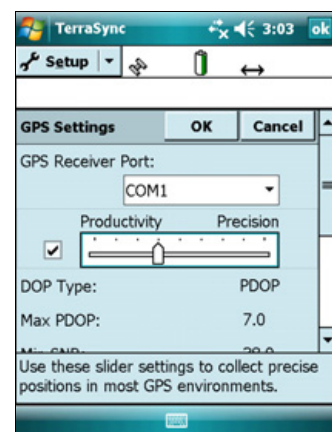
Connecting the field computer using the DB9-Lemo cable

Note – To be able to connect to a Trimble Nomad™ series handheld using a cable, you must purchase the optional serial boot for the handheld.

1. Connect one end of the antenna cable to the TNC connector on the rear of the receiver, and the other end of the cable to the antenna.
2. Connect the DB9 plug on the cable to the serial port on the field computer.
3. Connect the Lemo plug on the cable to the Lemo socket on the receiver.



4. Turn on the receiver.
5. To connect the Trimble GNSS field software to the GPS Pathfinder ProXRT receiver:
 - a. On the field computer, start the GNSS field software and then open the *Setup* section.
 - b. Tap **GPS Settings**. The *GPS Settings* form appears.
 - c. From the *GPS Receiver Port* field, select COM1 (or whatever the serial port is called on the field computer).
 - d. Tap **OK** to close the *GPS Settings* form.
 - e. To connect the software to the receiver, tap **GPS** at the top of the main screen of the Setup section.



Connecting the field computer using the DB9-DB9 cable

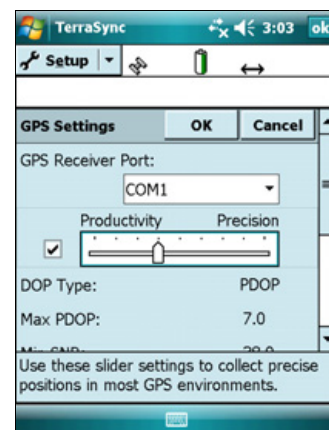
Note – To be able to connect to a Trimble Nomad series handheld using a cable, you must purchase the optional serial boot for the handheld.

If you use a cable to connect to an external real-time correction source, use the DB9-DB9 cable with the multiport adaptor to connect to the field computer. For more information, see [Connecting to an external differential correction source, page 37](#).

1. Connect one end of the antenna cable to the TNC connector on the rear of the receiver, and the other end of the cable to the antenna.
2. Connect one end of the DB9-DB9 cable to the serial port on the field computer.
3. Connect the other end of the cable to the multiport adaptor, and connect the multiport adaptor to the receiver.



4. Turn on the receiver.
5. To connect the GNSS field software to the receiver:
 - a. On the field computer, start the GNSS field software and then open the *Setup* section.
 - b. Tap **GPS Settings**. The *GPS Settings* form appears.
 - c. From the *GPS Receiver Port* field, select COM1 (or whatever the serial port is called on the field computer).
 - d. Tap **OK** to close the *GPS Settings* form.
 - e. To connect the software to the receiver, tap **GPS** at the top of the main screen of the Setup section.



Connecting to an external differential correction source

This section describes how to connect the GPS Pathfinder ProXRT receiver to an external correction source. If you are using the integrated SBAS or OmniSTAR receiver to receive real-time differential corrections, you do not need to connect another device. For more information about using the integrated receivers, see [Connecting to an integrated real-time differential correction source, page 53](#).

Types of external differential correction source

The types of external correction devices that you can connect to are described below.

Bluetooth-enabled cellular phone connected to a server

To access a VRS™ network or other correction source that is transmitting corrections over the Internet, use the Bluetooth radio in the field computer to connect to a Bluetooth-enabled cellular phone and then connect to the Internet.



Tip – You can use the TDL 3G cellular modem accessory instead of a Bluetooth-enabled cellular phone to connect the field computer to the Internet. For more information, see <http://www.trimble.com/tld3g.shtml>.

A VRS network uses data from several base stations to provide rover receivers with corrections that are generally more accurate than corrections from a single base station. Real-time differential corrections generated by a VRS network are commonly transmitted by an Internet server. Alternatively, you can connect to a server that provides real-time differential corrections from a single base station.

GeoBeacon receiver

You can configure the GPS Pathfinder ProXRT receiver to receive real-time differential corrections from a GeoBeacon™ receiver.

You can connect the GeoBeacon receiver to the field computer using Bluetooth wireless technology or using the DB9-Lemo cable. Alternatively, connect the GeoBeacon receiver to the GPS Pathfinder ProXRT receiver using the DB9-DB9 cable with the multiport adaptor.

External radio

You can configure the GPS Pathfinder ProXRT receiver to receive real-time differential corrections from an external radio. In addition to Trimble radios, the receiver supports third-party transparent radios and third-party cellular modems.

Connect the external radio to the field computer using the DB9-Lemo cable. Alternatively, connect the external radio to the receiver using the DB9-DB9 cable with the multiport adaptor.

Connecting a Bluetooth-enabled cellular phone for real-time corrections from an Internet source (including VRS networks)

To access a VRS network or other correction source that is transmitting corrections over the Internet, use the Bluetooth radio in the field computer to connect to a Bluetooth-enabled cellular phone and then connect to the Internet.

Note – Some cellular phones support the Bluetooth PAN (Personal Area Networking) service as well as the Bluetooth DUN (Dialup Networking) service. Because DUN connections are more common, this section assumes you are making a dialup network connection with the Bluetooth-enabled phone.



Tip – You can use the TDL 3G cellular modem accessory instead of a Bluetooth-enabled cellular phone to connect the field computer to the Internet. For more information, see <http://www.trimble.com/tdl3g.shtml>.

To connect to a Bluetooth-enabled phone using a Bluetooth DUN (Dialup Networking) connection, you must:

1. Connect the field computer to the receiver.
2. Connect the field computer to a Bluetooth-enabled phone and then configure the connection to the dialup network.
3. Connect to the Internet using the dialup network.
4. Configure the GNSS field software to use real-time corrections received from the Internet source.

Note – Before you begin the steps below, Trimble recommends that you confirm that the phone can access the Internet directly. If necessary, contact the cellular phone provider and confirm whether you must enter a user name, password, and domain details when connecting an external device to the phone using Bluetooth dialup networking.

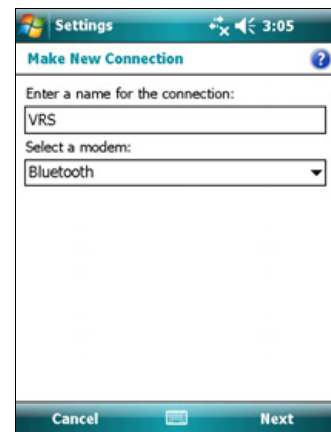


Step 1: Connecting the field computer to the receiver

Connect the field computer to the GPS Pathfinder ProXRT receiver, using either Bluetooth wireless technology or a cabled connection. For more information, see [Connecting to a field computer, page 31](#).

Step 2: Connecting the field computer to the phone and configuring the connection to the dialup network

1. Make sure that the field computer and the phone are within five meters of each other, and that the Bluetooth radio in each device is turned on.
2. On the field computer, tap  / *Settings* / *Connections* / *Connections*.
3. Below *My ISP*, tap *Add a new modem connection*.
4. Enter the name for the connection. For example, enter the name of the phone or the VRS network that you will connect to.
5. From the *Select a Modem* dropdown list, select **Bluetooth** and then tap **Next** on the right softkey.
6. If the phone you want to connect to is:
 - listed, go to [Step 7](#) below.
 - not listed:
 - a. Tap *Add new device* or *New Partnership*. The field computer searches for other Bluetooth devices and displays them in the list.
 - b. From the list of available devices, select the phone you want to connect to and then tap **Next** on the right softkey.
 - c. To pair with the phone, enter a passcode of your choice that you will easily remember onto the field computer and then tap **Next** on the right softkey.
 - d. When prompted by the phone, enter the same password and then accept the connection.
 - e. On the field computer, in the *Partnership Settings* screen, make sure that **Dialup Networking (DUN)** is selected and then tap **Finish** on the right softkey.



Note – To get to the *Partnership Settings* screen, select *Settings* / *Connections* / *Bluetooth*. Tap and hold the connected phone or modem and then tap *Edit*. Make sure that *Dialup Networking* is selected and then tap the **Save** softkey.

You have now created a partnership between the field computer and the phone so that they can communicate.

7. From the *My Connections* list, select the phone that you want to configure the connection to and then if required tap **Next** on the right softkey.
8. Enter the GPRS access number for the Internet.

Two of the common GPRS access numbers for cellular phones on GSM networks are *99**1# and *99#. If these access numbers do not work, contact the cellular phone provider to obtain the appropriate number to use.

Note – *You do not need to set up dialling rules or change the Internet connection settings on the phone. The connection settings you enter on the field computer are passed to the phone to use for this connection.*

9. Tap **Next** on the right softkey.
10. Unless the phone provider confirmed that you must enter user name, password, and domain settings to access the Internet, tap **Finish** on the right softkey without entering any information in this screen.

Otherwise:

- a. Enter the required information.
- b. If the phone provider has told you that you need to change the IP address or other settings for the connection, tap **Advanced**, configure these settings and then tap **OK** in the top right corner of the screen.
- c. Tap **Finish** on the right softkey.

You are returned to the *Connections* screen.

You have now configured the dialup networking connection.

Step 3: Connecting to the Internet using the dialup network

1. On the field computer, go to the *Connections* screen, if it is not already open (tap  / *Settings* / *Connections* / *Connections*).
2. Below **My ISP**, tap *Manage existing connections*.
3. Tap and hold the connection you want to use and then select *Connect*.
4. Unless the phone provider confirmed that you must enter user name, password, and domain settings to access the Internet, tap **OK** on the left softkey without entering any information in this screen. Otherwise, enter the required information and then tap **OK** on the left softkey.
5. If the phone prompts you for confirmation to connect to the Internet, accept the connection.

The phone dials the configured GPRS access number and then connects to the Internet.

A Connectivity notification appears on the field computer as the connection is being made.

After the connection is made you are returned to the *My ISP* screen.

To confirm that the field computer is connected to the phone, or to check the status of the connection at any time, tap the Connectivity icon  in the title bar. The notification shows the name of the current connection, and the connection status. To hide the notification, tap **Hide**.

Note – If you have an active wireless LAN connection, the connectivity icon appears as  instead.

6. Tap **OK** in the top right corner of the screen to close the *My ISP* screen.
7. Tap **OK** in the top right corner to close the *Connections* screen.
8. Tap  in the top right corner to close the *Settings* screen.

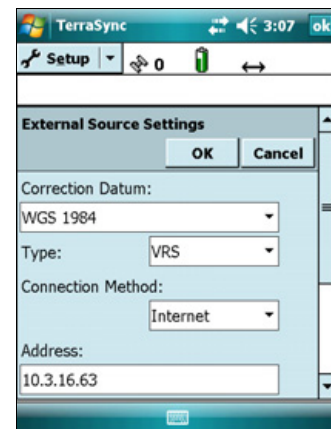
To check the connection status at any time, tap the  or  icon in the title bar.

To end the connection at any time, tap the  or  icon in the title bar and then tap **Disconnect**.

Note – The Connectivity icon differs depending on the connection type. For example, if a GPRS connection is active, it shows as .

Step 4: Configuring the GNSS field software to use real-time corrections from the Internet source

1. On the field computer, start the Trimble GNSS field software and then open the *Setup* section.
2. Tap **Real-time Settings**. The *Real-time Settings* form appears.
3. From the *Choice 1* field, select **External Source**.
4. Configure the external source:
 - a. Tap the Setup button  beside the *Choice 1* field. The *External Source Settings* form appears.
 - b. From the *Correction Datum* field, select the same datum as the VRS network coordinate system.
 - c. From the *Type* field, select:
 - **VRS** if the real-time correction source is a VRS network.
 - **Single Base** if the real-time correction source is a single base station that broadcasts its corrections over the Internet.
 - d. From the *Connection Method* field, select **Internet**.
 - e. In the *Address* field, enter the IP address or URL of the VRS network or the server that is supplying the corrections from the VRS network.
 - f. In the *Port* field, enter the port number that you will use to connect to the server.



- g. If you are connecting to a VRS network through a broadcast server, tap the Setup button  beside the *Source* field. The GNSS field software attempts to establish a connection to the broadcast server. If the connection is successful, the *Select Server* form appears. Select the server that you want to use and then tap **OK** to return to the *External Source Settings* form.
 - h. If you selected a VRS network that requires authentication, the *Name* and *Password* fields appear. Enter the user name and password that you obtained from the service provider.
 - i. From the *Connection Control* field, select:
 - **Auto** if you want the GNSS field software to automatically establish and end connections to the VRS network as necessary.
 - **Manual** if you want to connect or disconnect only when you tap **Ext Source** in the *Setup* screen.
 - j. Tap **OK** to confirm the settings and return to the *Real-time Settings* form.
5. Tap **OK** to confirm the real-time settings and return to the main screen of the Setup section.

If you selected **Auto** in the *Connection Control* field, the **Ext Source** button is depressed and the software attempts to connect to the server.
 6. If you selected **Manual** in the *Connection Control* field, tap the **Ext Source** button that appears below the Status bar in the Setup section to connect the Trimble GNSS field software to the Internet correction source.



Tip – To disconnect or reconnect to the server at any time, tap **Ext Source**. To view the status of the real-time correction source, open the Status section, select the Real-time subsection and then select *External* from the **Summary** list button.

Reconnecting to the Internet

To reconnect to the Internet at any time after setting up the connection, repeat steps 3 through 8 on [page 40](#).

If you selected **Auto** in the *Connection Control* field of the Trimble GNSS field software, the software automatically connects to the Internet source that is providing real-time differential corrections.

To **manually** reconnect the Trimble GNSS field software to the Internet source that is providing real-time differential corrections, open the software and then tap the **Ext Source** button that appears below the status bar in the Setup section.

Connecting the GeoBeacon receiver to the field computer using Bluetooth wireless technology

To receive real-time corrections from a GeoBeacon receiver that is connected to the field computer using Bluetooth wireless technology, you must:

1. Connect the field computer to the GPS Pathfinder ProXRT receiver.
2. Connect the field computer to the GeoBeacon receiver.
3. Configure the COM port on the field computer to use for the GeoBeacon receiver connection.
4. Configure the GNSS field software to use real-time corrections received from the GeoBeacon receiver.

Step 1: Connecting the field computer to the receiver

Connect the field computer to the GPS Pathfinder ProXRT receiver, using either Bluetooth wireless technology or a cabled connection. For more information, see [Connecting to a field computer, page 31](#).

Step 2: Connecting the field computer to the GeoBeacon receiver

1. Make sure that the Bluetooth radios in the field computer and the GeoBeacon receiver are turned on, and that the devices are within range.
2. On the field computer, tap  / *Settings* / *Connections* / *Bluetooth*.
3. In the *Devices* tab, tap *Add new device* or *New Partnership*.

The field computer searches for other Bluetooth devices and displays them in the list.

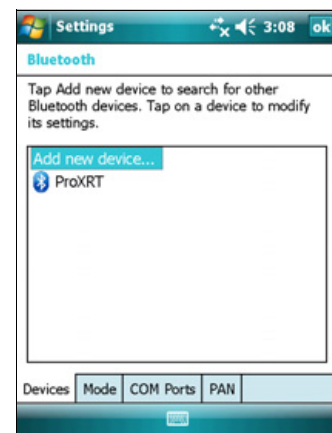
4. From the list of available devices, select the GeoBeacon receiver and then tap **Next** on the right softkey.

The *Enter Passcode* screen appears.

5. Tap **Next** without entering a passcode.
6. If prompted to add the device to your device list, tap **No**.

The *Partnership Settings* screen appears.

7. If required, change the name of the device in the *Display Name* field.
8. Select the **Serial Port** check box. Depending on the Windows Mobile operating system version, this may appear automatically, or you may need to select the **Advanced** right softkey, or tap the connected GNSS receiver again. Then tap **Save** or **Finish** on the right softkey.
9. Tap **OK** in the top right corner of the screen to close the Bluetooth application.

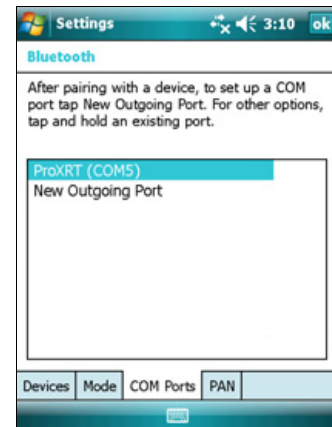


10. Tap  in the top right corner to close the *Settings* screen.

You have now created a partnership between the field computer and the GeoBeacon receiver so that they can communicate.

Step 3: Configuring the COM port to use on the field computer

1. On the field computer, tap  / *Settings* / *Connections* / *Bluetooth*.
2. Tap the *COM Ports* tab.
3. Tap *New Outgoing Port*.
4. Select the GeoBeacon receiver and then tap **Next** on the right softkey.
5. Select the COM port on the field computer to use for the connection.
6. **Clear** the *Secure Connection* check box.
7. Tap **Finish** on the right softkey.
8. Tap **OK** in the top right corner to close the Bluetooth application.
9. Tap  in the top right corner to close the *Settings* screen.



The connection between the field computer and the GeoBeacon is now set up, and the devices are connected.



Tip – The GeoBeacon receiver has been added to the list of Client Serial Ports. To use this connection any time, turn on the GeoBeacon receiver and then the Bluetooth radio in the field computer.

10. Configure the GNSS field software to use the corrections from the GeoBeacon receiver (see [page 47](#)).



Connecting an external source to the field computer using a cable

Note – If the field computer has only one serial port and you are using that port to connect to the ProXRT receiver, connect the external correction source to the ProXRT receiver instead of the field computer (see [page 46](#)).

1. Connect the field computer to the ProXRT receiver (see [Connecting to a field computer, page 31](#)).
2. If the external source has an integrated Bluetooth radio, turn off the Bluetooth radio.

Note – You cannot operate the GeoBeacon receiver over a cabled connection and use the GeoBeacon receiver's integrated Bluetooth radio at the same time. Turn off the radio before connecting the cable to the GeoBeacon receiver.

3. Connect one end of the DB9-DB9 cable to the field computer.
4. Connect the other end of the cable to the external source.



5. Configure the GNSS field software to use the corrections from the external source (see [page 47](#)).
6. If you are connecting to an external radio, configure the radio separately, using either the configuration program for the external radio or the radio display and keypad.

Note – When used with the ProXRT receiver, most external radios require an external power source.

Connecting an external source to the ProXRT receiver using a cable

Use this method if the field computer has only one serial port and you are using that port to connect to the GPS Pathfinder ProXRT receiver.

1. Connect the field computer to the receiver (see [Connecting to a field computer, page 31](#)).
2. If the external source has an integrated Bluetooth radio, turn off the Bluetooth radio.

Note – You cannot operate the GeoBeacon receiver over a cabled connection and use the GeoBeacon receiver's integrated Bluetooth radio at the same time. Turn off the radio before connecting the cable to the GeoBeacon receiver.

3. Connect one end of the DB9-DB9 cable to the external source.
4. Connect the other end of the cable to the DB9 socket on the multiport adaptor and then connect the other end of the adaptor to the 26-pin plug on the receiver.



5. Configure the GNSS field software to use the corrections from the external source (see [page 47](#)).
6. If you are connecting to an external radio, configure the radio separately, using either the configuration program for the external radio or the radio display and keypad.

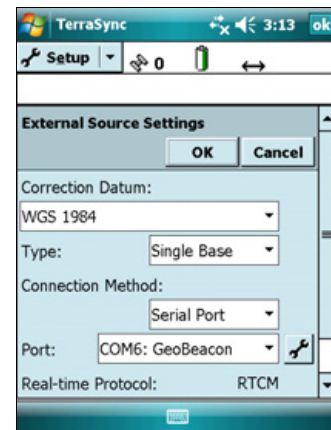
Note – When used with the ProXRT receiver, most external radios require an external power source.

Configuring the GNSS field software to use corrections from an external source

Note – For information on configuring the GNSS field software to use corrections from a VRS network or single base station that transmits corrections over the Internet, see [Step 4: Configuring the GNSS field software to use real-time corrections from the Internet source, page 41](#).

To configure the software to use corrections from a cellular modem, a GeoBeacon receiver, or an external radio:

1. On the field computer, start the Trimble GNSS field software and then select *Setup*.
2. Tap **Real-time Settings**. The Real-time settings form appears.
3. In the *Choice 1* field, select External Source.
4. Tap the **Setup** button  next to the *Choice 1* field.
5. In the *Type* field, select *Single Base*.
6. In the *Connection Method* field, select the method used to connect the external device. If the device is connected to:
 - an Internet server, see [page 41](#).
 - the field computer, select **Serial Port** and then select the COM port to use from the *Port* field. If the device is connected by cable, select COM1. If it is connected using Bluetooth wireless technology, select the COM port you configured for the Bluetooth connection in the Bluetooth control software.
 - the receiver, select **Receiver Port** and then select the port to use from the *Port* field.
7. Tap **OK**.



For more information, refer to the documentation provided with the GNSS field software.

Configuring the GNSS receiver

In this chapter:

- Supported GNSS field software
- Configuring the GNSS field software to connect to the receiver
- Using the GNSS field software
- Connecting to an integrated real-time differential correction source
- Ensuring the accuracy of your GNSS data
- Tracking GLONASS satellites

The GPS Pathfinder ProXRT receiver enables you to collect GPS data, and GLONASS data if the GLONASS option is installed, for incorporating into a GIS or for managing assets.

This chapter explains how to configure the receiver using supported Trimble GNSS field software.

For more information on GPS and GLONASS, see [Appendix A, Understanding GNSS](#).

Supported GNSS field software

You can use the GPS Pathfinder ProXRT receiver with any of the software products described below.

Note – *If you purchase the optional NMEA upgrade, the ProXRT receiver can be used with software—other than that described below—which supports the NMEA message format. Otherwise the receivers do not operate with other software.*

You can install the software on a field computer, notebook, or Tablet PC.

For supported versions of all software listed below, see the [GPS Pathfinder ProXRT Customer FAQs](#).

TerraSync software

Use the software to collect and maintain GIS and GNSS data.

ESRI ArcPad software and the Trimble GPSCorrect extension

Use the ArcPad software to collect and maintain GIS and GNSS data, and use the GPSCorrect extension to connect to, configure, and control the receiver.

Other GNSS field applications

You can use the GPS Pathfinder ProXRT receiver with a custom application developed using the Trimble GPS Pathfinder Tools Software Development Kit (SDK).

Configuring the GNSS field software to connect to the receiver

The receiver has two physical serial COM ports and three Bluetooth COM ports for communicating with software on the field computer and with external devices.

COM1 is the serial cable (Lemo) port.

COM2 is the DB9 port. This port is available when the multiport adaptor is connected to the 26-pin port on the receiver.

COM1, COM2, and the Bluetooth COM ports are standard serial ports that connect to external devices. You can use any of the COM ports to connect the receiver to supported GNSS field software or to input real-time corrections. For more information, see [Chapter 3, Connecting to Other Equipment](#).

Using the GNSS field software

Connect the GPS Pathfinder ProXRT receiver to a field computer running the GNSS field software and use the software to do some or all of the following:

- check the current GNSS status
- configure settings such as GNSS, real-time correction, and antenna settings
- configure data logging settings
- connect to a real-time correction source
- collect features
- navigate to existing features

For more information, refer to the rest of this chapter and the documentation for the GNSS field software.



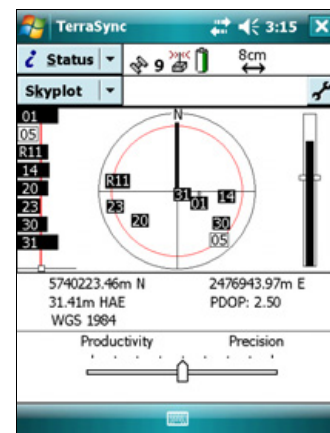
CAUTION – Do not use the front panel of the GPS Pathfinder ProXRT receiver to configure the receiver settings. Any settings you configure are reset the next time you connect to the receiver from the GNSS field software, and using the front panel to reconfigure settings during data collection may cause problems with your data. To avoid this issue, always configure the receiver using the GNSS field software.

Viewing current GNSS status

In the *Status* section, use the graphical *Skyplot* screen or the *Satellite Info* screen in the GNSS field software to view detailed GPS and GLONASS information.

Note – To receive signals from GPS and GLONASS satellites, the antenna must have a clear view of the sky. GNSS positions may not always be available, particularly in or near buildings, in vehicles, or under tree canopy.

Filled (black) boxes represent satellites that the receiver is using to compute its current GNSS position. Unfilled (white) boxes represent satellites that the receiver is getting signals from but is not using because the signals are too weak, or they do not have a differential correction and the receiver is set to wait for real-time. In the example shown here, eight satellites are being tracked and seven of these satellites are being used to compute GNSS positions.



Note – Numbers with no box represent satellites that are available, but that the TerraSync software is not receiving signals from.

Satellites that have an “R” prefix are GLONASS satellites. These satellites appear only if the receiver has the GLONASS option installed, and the *Use GLONASS* option is enabled in the *GPS Settings* form. For more information, see [Tracking GLONASS satellites](#), page 60.

Your current GNSS position is displayed at the bottom of the screen.



Tip – For detailed information on satellite positions and signal strengths, use the *Satellite information* screen in the *Status* section.

To compute a three-dimensional GNSS position, you need a minimum of four satellites with good geometry. When you switch on the receiver, it automatically starts to track visible satellites and to calculate its current position. If the receiver is computing GNSS positions, the satellite icon in the Status bar and the number beside the icon are solid.

Note – To compute a decimeter-level three-dimensional position using real-time H-Star technology, the receiver must track at least five satellites that the base station is also tracking. During dual-constellation operation, when using GPS and GLONASS, the receiver must track at least six satellites.

Ensuring the accuracy of your GNSS data

The GPS Pathfinder ProXRT receiver is a high performance GNSS receiver that calculates very accurate GNSS positions.

The list below identifies the most important settings and techniques that you can use in the field to improve the accuracy of your data:

Note – *The list is in order of most important to least important.*

1. Use real-time differential corrections. If more than one real-time differential correction source is available to you, use the one that provides the more accurate corrections. For more information, see [Connecting to an integrated real-time differential correction source, page 53](#) and [Connecting to an external differential correction source, page 37](#).
2. If you are using TerraSync software to collect data, use accuracy-based logging. For more information, see [page 57](#).
3. Configure the GNSS settings for the receiver to increase the precision of your data, and to minimize the effect of atmospheric interference and poor satellite geometry. For more information, see [page 58](#).
4. Make sure that the data collection software is configured to log H-Star data, by default. For more information, see [page 59](#).
5. Plan GNSS data collection around the times of the day when satellite geometry is best. For more information, see [page 59](#).

Connecting to an integrated real-time differential correction source

Use a real-time differential correction source to give you better accuracy as you collect data. For more information on:

- collecting data using H-Star technology, see [Collecting real-time H-Star data, page 96](#)
- how real-time differential correction works, see [Differential correction explained, page 96](#).

The GPS Pathfinder ProXRT receiver has an integrated OmniSTAR receiver and an integrated SBAS receiver for easy connection to an OmniSTAR differential correction service (see below) or an SBAS system (see [page 56](#)).

Note – *To connect to an **external** real-time differential correction source, such as a **VRS network** or **GeoBeacon receiver**, or to configure the GNSS field software to use corrections from an external real-time differential correction source, see [Connecting to an external differential correction source, page 37](#).*

Using OmniSTAR real-time corrections

The GPS Pathfinder ProXRT receiver can use OmniSTAR differential correction messages to improve the accuracy and integrity of GNSS data. OmniSTAR differential correction messages provide valid corrections over a large area.

To receive and decode these messages, you must subscribe to an OmniSTAR differential correction service. Currently, the levels of service offered are:

- HP (High Performance) achieves better than 10 centimeters
- XP achieves better than 20 centimeters
- VBS (Virtual Base Station) achieves sub-meter positioning
- G2, an optional service to HP and XP, that provides GLONASS corrections.

Note – *To achieve these levels of accuracy, the receiver must be operating within the coverage footprint of the service.*

Note – *Currently HP and G2 are supported on the ProXRT receiver.*

For phone numbers and information on obtaining a subscription, subscription rates, and service coverage maps, go to www.omnistar.com.

Once you have a subscription, you must activate the service through an over-the-air signal.

Activating the OmniSTAR differential service

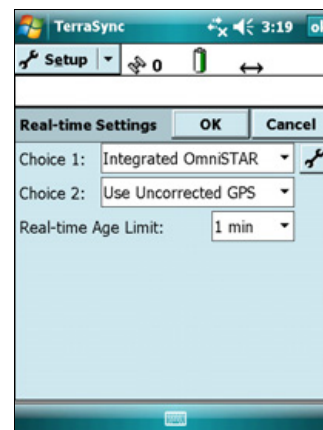
1. Connect the receiver to the field computer that is running the GNSS field software. For more information, see [Connecting to a field computer, page 31](#).
2. Call OmniSTAR and give them:
 - your location (for example, Sunnyvale, California, USA)
 - the model number and serial number of your GPS Pathfinder ProXRT receiver (look at the label on the bottom of the receiver)
 - your payment option
 - the subscription method. The methods are over-the-air or by manual entry. Request the **over-the-air** method.

Note – *The receiver must be in an open-air environment and in sight of the appropriate OmniSTAR satellite to be granted access to the OmniSTAR system.*

OmniSTAR gives you the OmniSTAR satellite and frequency information for your local area.

The service technician advises you of the approximate time when the subscription will be transmitted. This is usually within 15 minutes. The first time a receiver is put into service or after a long period of storage, it may take up to 30 minutes for the receiver to accumulate all the required information from the OmniSTAR and GPS or GLONASS satellites. The technician can delay the transmission for a period so that you can put the receiver into service.

3. In the GNSS field software, select *Setup*, open the Real-time section and then tap the **Setup** button .
4. In the *Choice 1* field, select Integrated OmniSTAR.
5. Tap the **Setup** button  next to the *Choice 1* field.
6. If you are using a VBS service, select the datum used by the service in the *VBS Correction Datum* field.
7. From the Name field, select the appropriate OmniSTAR satellite.



The *Frequency* and *Data Rate* fields are automatically updated.

8. Tap **OK** to return to the *Real-time Settings* screen.
9. In the *Choice 2* field, specify whether to use SBAS corrections, uncorrected positions, or to stop using GNSS positions if corrections are not available.
10. Tap **OK**.
11. Wait up to 45 minutes for the activation process to complete.

Note – If the activation process does not complete within 45 minutes, call OmniSTAR and report the problem.

Note – The 45-minute wait period is for service activation only. Once the service is activated, OmniSTAR corrections begin less than 10 seconds after you configure the receiver to receive them.

You need to activate the subscription only once. However, each time you want to use real-time corrections from the OmniSTAR service in the field you must connect to the service (see [page 55](#)).

Connecting to the OmniSTAR differential service

To receive real-time corrections from an OmniSTAR differential service in the field, make sure that Integrated OmniSTAR is selected in the *Choice 1* field of the *Real-time Settings* form of the GNSS field software (see steps 3 through 8 on [page 55](#)).

Once the receiver is connected to the OmniSTAR differential service, the estimated accuracy of the current position gradually improves to the accuracy specified by the correction service. This process is referred to as **convergence**, and the time it takes to achieve this is referred to as **initialization**.

The initialization times vary and can take up to 60 minutes, depending on the type of OmniSTAR service you are connecting to, whether the receiver is moving, and environmental conditions such as the satellite geometry, multipath and so on.

To check the progress of convergence, use the estimated accuracy value in the status bar of the GNSS field software.

You can also check the current level of service in the Real-time status screen. When you first connect to the OmniSTAR service, the *Service Level* field always shows VBS. If you have subscribed to a higher service level, this field is automatically updated to XP or HP once that service level is reached.

The receiver must track a minimum of five GPS satellites to maintain the solution. If the receiver loses lock on GPS satellites for less than 3 minutes, the OmniSTAR solution reinitialises quickly, and you do not have to wait for the OmniSTAR solution to initialize again. The success rate of re-initialisation depends on the time without GNSS lock, the level of multipath, and the number of satellites available before and after the loss of lock.

If you disconnect from the OmniSTAR service and do not reconnect within five minutes, you must wait for the OmniSTAR solution to initialize again.

Note – *The OmniSTAR VBS service provides submeter positions almost immediately and no lengthy (re)initialization period is required with VBS.*

Using SBAS real-time corrections

The GPS Pathfinder ProXRT receiver can use Satellite Based Augmentation Systems (SBAS) correction messages to improve the accuracy and integrity of GPS data.

The default SBAS tracking mode is Auto. In Auto mode, the receiver tracks or locks onto the most powerful satellite signal. The GNSS receiver can track two SBAS satellites at the same time in Auto or Custom mode. It uses corrections from only one SBAS satellite at a time, but tracking two satellites can improve the availability of SBAS real-time corrections. For example, if you are working in environments where obstacles may block the direct line of sight to the SBAS satellite, there is less chance of signal loss if you are tracking more than one SBAS satellite.

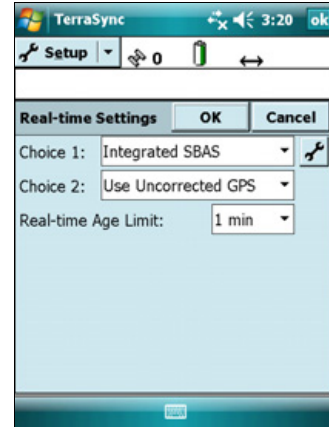
The receiver tracks SBAS satellites according to your geographical location:

- Wide Area Augmentation System (WAAS) satellites are tracked in the Continental United States including Alaska, and parts of Canada and Mexico.
- European Geostationary Navigation Overlay Service (EGNOS) satellites are tracked in Europe.
- MTSAT Satellite-based Augmentation System (MSAS) satellites are tracked in Japan.

You can configure the receiver to use particular SBAS satellites in the *Integrated SBAS Settings* form of the Trimble GNSS field software. Select the Custom option in the *Tracking Mode* field and then enable or disable tracking for any specific satellite.

To use SBAS corrections:

1. Connect the receiver to the field computer that is running the GNSS field software. For more information, see [Connecting to a field computer, page 31](#).
2. In the GNSS field software, select *Setup*, open the Real-time section and then tap the **Setup** button .
3. In the *Choice 1* field, select Integrated SBAS.
4. To select particular satellites, tap the **Setup** button  next to the *Choice 1* field.
5. Select Custom tracking mode and then enable or disable tracking of particular satellites.
6. Tap **OK** to return to the *Real-time Settings* screen.
7. In the *Choice 2* field, specify whether to use uncorrected positions, or to stop using GNSS positions, if corrections are not available.
8. Tap **OK**.



Using accuracy-based logging

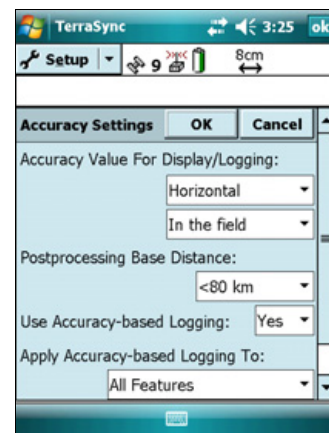
If you are using the TerraSync software, use accuracy-based logging to ensure that only GNSS positions that meet the specified estimated accuracy are logged. GNSS positions that do not meet your accuracy requirements are not logged.

Note – *Accuracy estimates for streaming (dynamic) GNSS positions may not be as good as those for static GNSS positions.*

To configure accuracy-based logging in the TerraSync software:

1. In the Setup section of the TerraSync software, tap **Logging Settings**. The *Logging Settings* form appears.
2. Tap the **Setup** button  below the *Accuracy Settings* field. The *Accuracy Settings* form appears.

3. In the *Accuracy Value For Display/Logging* fields, select the parameters that will be used to determine the estimated accuracy:
 - Select whether to use the horizontal or vertical accuracy of the current GNSS position.
 - Select *In the field* to use the current estimated accuracy (recommended if you are using a real-time correction source), or select *After postprocessing* to use the predicted accuracy that will be achieved after the field data has been postprocessed.



4. If you selected *After postprocessing*, select the estimated distance to the base station that will be used for postprocessing from the *Postprocessing Base Distance* field. If you will use more than one base station (during H-Star processing), specify the estimated distance to the closest base station.
5. Set the *Use Accuracy-based Logging* field to *Yes*. The settings fields for accuracy-based logging appear.
6. In the *Apply Accuracy-based Logging To* field, select the feature types that you want to log only if the GNSS positions meet your required accuracy.
7. In the *Required Accuracy* field, select the estimated accuracy that is required before GNSS positions are logged.
8. Tap **OK**.

Note – Accuracy settings do not affect GNSS positions that are used for navigation. GNSS positions are still calculated by the GNSS receiver and are available for navigation.

Configuring GNSS quality settings

In the GNSS field software *Setup* section, use the *GPS Settings* form to configure the GNSS quality settings you require. The lower the GNSS quality settings, the more productive you are likely to be, as the GNSS receiver will track more satellites and be better able to calculate a GNSS position. The stricter the GNSS quality settings, the more precise the GNSS positions that are calculated.

Note – If you are using the TerraSync software, Trimble recommends that you use accuracy-based logging to control the quality of the GNSS positions logged. Use the default GNSS quality settings and let the TerraSync software manage the logging of positions based on your required accuracy. For more information, see [Using accuracy-based logging, page 57](#).

By default, the receiver is configured to receive satellite signals in most conditions.

To open the *GPS Settings* form, do one of the following:

- Tap **GPS Settings** in the Setup section.
- Tap  in the Skyplot, Satellite Info, or Plan in the *Status* section.

For more information on manually configuring GNSS quality settings, refer to the documentation for the GNSS field software.

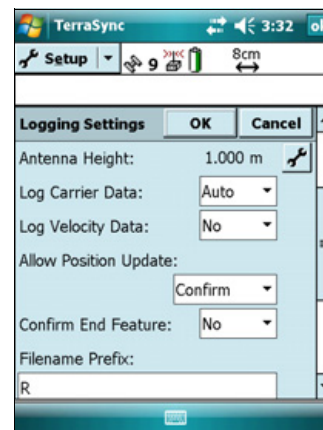
Logging H-Star carrier data

When you are using a GPS Pathfinder ProXRT receiver, Trimble GNSS field software logs H-Star carrier data by default. When you log carrier data, the GNSS receiver logs additional data as well as GNSS position records. The additional data is used during postprocessing to improve the accuracy of the GNSS positions.

In the TerraSync software versions 4.10 and later, carrier phase logging is automatic.

In the TerraSync software versions earlier than 4.10, make sure that carrier phase logging is enabled. To check that the software is logging H-Star carrier data:

1. In the Setup section of the GNSS field software, tap **Logging Settings**. The *Logging Settings* form appears.
2. In the *Log Carrier Data* field, make sure **Auto** is selected and then tap **OK**.

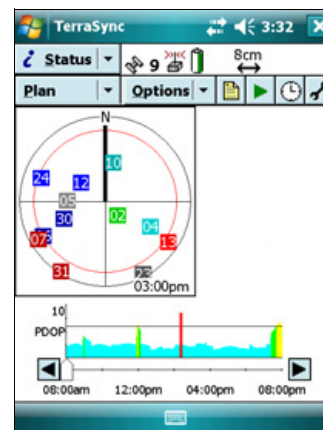


Planning a data collection session

To maximize productivity, plan GNSS data collection around the times of the day when satellite geometry is best. Trimble GNSS field software includes a Plan option in the *Status* section with an animated skyplot and DOP (satellite geometry) graph for your position for up to the next 12 hours.

In the Plan screen, you can check the planning skyplot as you plan a session, then use the timeline to zoom in on times when geometry is poor. As you adjust GNSS settings (tap ) the Plan screen is updated, so you can see the effect of different quality control settings.

Note – The Plan section in the GNSS field software does not show the availability of GLONASS satellites. To plan data collection sessions using both GPS and GLONASS satellites, use the office-based Trimble Planning utility. To download this utility, go to www.trimble.com/planningsoftware_ts.asp and then click the relevant link.



Tracking GLONASS satellites

If you purchase the Upgrade to GLONASS option, the receiver can track satellites that are part of the GLONASS system (GLObal NAVigation Satellite System). Tracking GLONASS satellites as well as GPS satellites can improve productivity by reducing the time required to achieve real-time decimeter or subfoot solutions and increasing the amount of data collected, particularly in tough environments such as around tall buildings and under heavy tree canopy.

Note – *To use GLONASS satellites in the solution, the base station must also be able to track GLONASS satellites.*

To purchase the Upgrade to GLONASS option, contact your Trimble reseller.

After purchase, you must install the Upgrade to GLONASS option onto the receiver and then configure the GNSS field software to use GLONASS satellites.

Installing the Upgrade to GLONASS option

After purchasing the Upgrade to GLONASS option, install the option onto the receiver using the WinFlash utility and the steps below. For more information, refer to the *WinFlash Help*.

The WinFlash utility runs on Windows 95, 98, Windows NT®, 2000, Me, XP, or Windows Vista® operating systems. The utility is available for download from the Trimble website.

Downloading the WinFlash utility

1. Go to the GPS Pathfinder ProXRT receiver technical support page (www.trimble.com/pathfinderproxrt_ts.asp) and then click *Downloads*.
2. Click the *WinFlash Utility for vx.xx GPS Firmware* link.
3. The *File Download* dialog appears. Click **Save** to save the files to your desktop to run later.
4. To install the WinFlash utility onto the computer, browse to the location where you saved the WinFlash Utility files and then double-click WFS-ProXRT-vxxx.exe to start the WinFlash utility.

Note – *Make sure that you download a version of Winflash later than version 4.15.*

Installing the Upgrade to GLONASS option onto the receiver

1. Connect one end of the DB9-DB9 cable to the computer. Connect the other end of the cable to the DB9 socket of the multiport adaptor and then connect the other end of the adaptor to the 26-pin port on the receiver.
2. On the computer, click *Start / Programs / WinFlash / WinFlash*. The *Device Configuration* screen appears.
3. From the *Device configuration* list, select your receiver.

4. From the *PC serial port* field, select the serial (COM) port on the computer that the receiver is connected to.
5. Click **Next**.
The *Operation Selection* screen appears. The *Operations* list shows all of the supported operations for the selected device. A description of the selected operation is shown in the *Description* field.
6. Select *Update Receiver Options* and then click **Next**.
The *GPS Software Selection* screen prompts you to select the software that you want to install on the receiver.
7. Enter the password for the Upgrade to GLONASS option that you received from your Trimble reseller.
8. From the *Available Software* list, select the latest version and then click **Next**.
The *Settings Review* screen prompts you to connect the receiver and lists the receiver configuration and selected operation.
9. If all is correct, click **Finish**.
The *Software Upgrade* window shows the status of the installation (for example, **Establishing communication with <your receiver>. Please wait.**).
10. Click **OK**.
The *Software Upgrade* window shows that the operation was completed successfully.
11. To select another operation, click **Menu**; to quit, click **Exit**.
12. If prompted, click **OK** to confirm you want to exit the software.

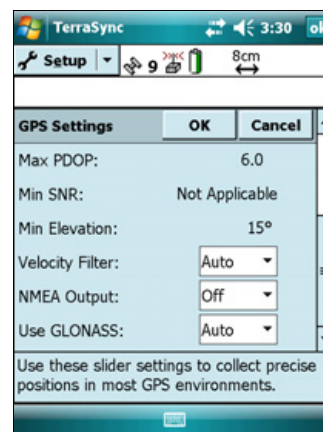
Configuring the GNSS field software to track GLONASS satellites

1. In the Setup section of the GNSS field software, tap **GPS Settings**. The *GPS Settings* form appears.
2. In the *Use GLONASS* field, make sure that **Auto** is selected.

Note – Selecting *Auto* in this field has no effect if the *Upgrade to GLONASS option* is not installed on the *GPS Pathfinder ProXRT* receiver.

3. Tap **OK**.

Note – For versions of the *GPS Pathfinder Office* software earlier than 4.20, when the *Auto* option is selected, it is possible that autonomous or real-time corrected positions that were calculated in the field may fail to be corrected during postprocessing. This is because positions in the field are calculated using both GLONASS and GPS measurements, but the postprocessed positions are calculated using GPS measurements only. If you



require every GNSS position in the field to have a matching postprocessed position in the office, select No in the Use GLONASS field. For GPS Pathfinder Office software version 4.20 and later, the postprocessing engine supports GLONASS positions.

Configuring the Receiver Using the Web Browser Interface

In this chapter:

- [Configuring Ethernet settings](#)
- [Configuring the receiver using a web browser](#)
- [Menus](#)

You can configure the ProXRT receiver via the Web Browser interface. The Web Browser interface provides an easy way to configure NMEA Output settings.

This chapter explains the Web Browser interface menu options.

Note – *If you are using Trimble field software, the field software settings will override most receiver settings. Trimble recommends that you configure the receiver using the Web Browser interface only if you are not using Trimble field software.*

Configuring Ethernet settings

The receiver has an Ethernet port so that the receiver can connect to an Ethernet network. You can use the Ethernet network to access, configure, and monitor the receiver. No serial cable connection to the receiver is necessary.

The receiver requires the following Ethernet settings:

- IP setup: Static or DHCP
- IP address
- Netmask (Submask)
- Broadcast IP address
- Gateway IP address
- DNS IP address
- HTTP port

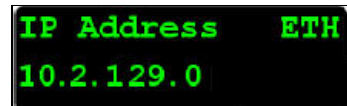
The default setting for the HTTP port is 80. The HTTP port is not assigned by the network. HTTP port 80 is the standard port for web servers. This allows you to connect to the receiver by entering only the IP address of the receiver in a web browser. If the receiver is set up to use a port other than 80, you will need to enter the IP address followed by the port number in a web browser.

Example of connecting to the receiver using port 80: `http://10.2.129.0`

Example of connecting to the receiver using port 4000: `http://10.2.129.0:4000`

The default setting of the receiver is DHCP enabled. Using DHCP enables the receiver to automatically obtain the IP address, Netmask, Broadcast, Gateway, and DNS address from the network that it is connected to. Obtaining these settings automatically may take several minutes.

To verify the IP address, select the up button from the keypad when the Home screen is displayed. The Ethernet IP address appears. If the receiver fails to get a network-assigned IP address, the IP address screen displays as 169.254.1.0. You may see this for several minutes while the receiver automatically obtains the details it requires from the network.



```
IP Address  ETH
10.2.129.0
```

Configuring the receiver using a web browser

This section describes how to configure the receiver using the web browser. The web browser requires a computer running a web browser. The computer must be connected to the receiver in one of the following ways:

- Peer-to-peer using Ethernet cross-over cable or Bluetooth wireless technology
- Through a Local Area Network (LAN)
- Through the Internet

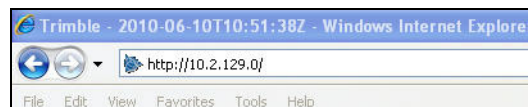
Supported browsers

- Google Chrome
- Microsoft Internet Explorer® version 6.00 or later for Windows operating systems
- Mozilla Firefox version 1.07 or later (version 1.50 or later is recommended for Windows, Macintosh, and Linux operating systems)
- Opera version 10
- Apple Safari version 4.0

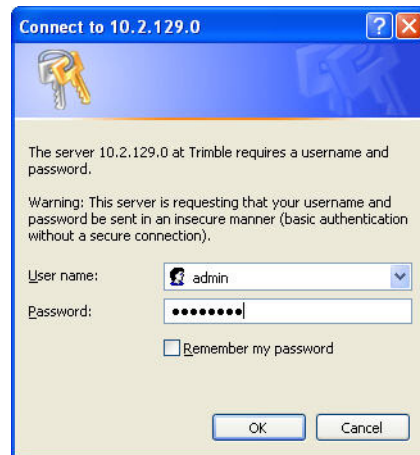
Connecting to the receiver using a web browser

If the receiver is connected to a network, you can open up a web browser and connect directly to the receiver.

1. Enter the IP address of your receiver (see [Configuring Ethernet settings, page 64](#)) into the address bar of the web browser as shown:



2. If security is enabled on the receiver, the web browser prompts you to enter a username and password. The default login values for the receiver are:
 - User Name: **admin**
 - Password: **password**



If you cannot connect to the receiver, the password for the admin account may have been changed, or a different account may be in use. Contact your receiver administrator for the appropriate login information.

Connecting to the receiver using a web browser and Bluetooth wireless technology

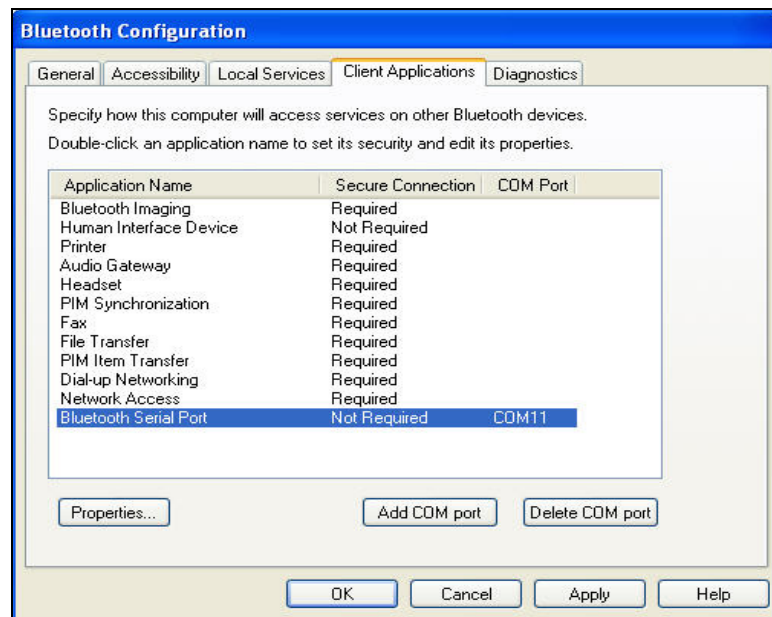
If your receiver is not connected to a network, but is close enough to the computer to be connected using Bluetooth wireless technology, you can set up the Bluetooth connection and open up a web browser to configure the receiver.

There are two stages to this:

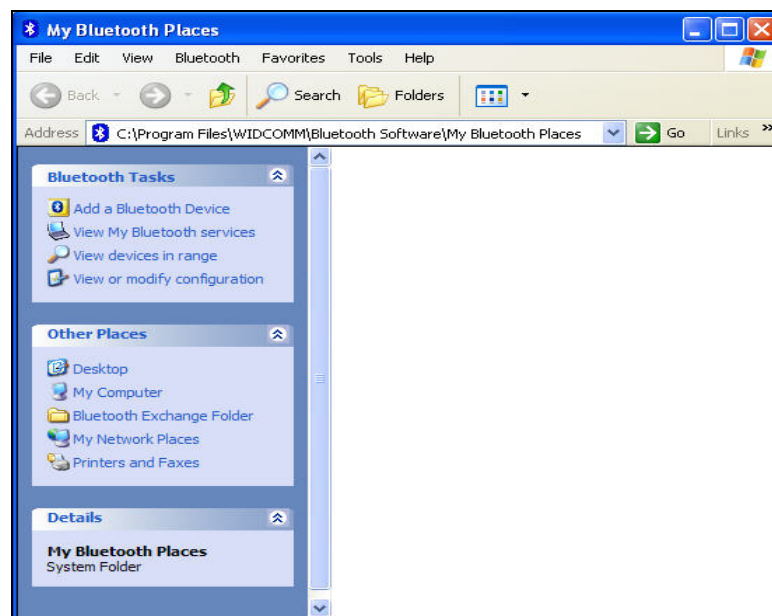
- setting up the Bluetooth communication link to the receiver
- setting up the computer connection to the receiver using the Bluetooth communication link.

This section describes how to access the web interface on a ProXRT receiver, using Bluetooth wireless technology on an office computer that has Service Pack 3 of the Windows XP operating system (Professional Edition version 2002) installed.

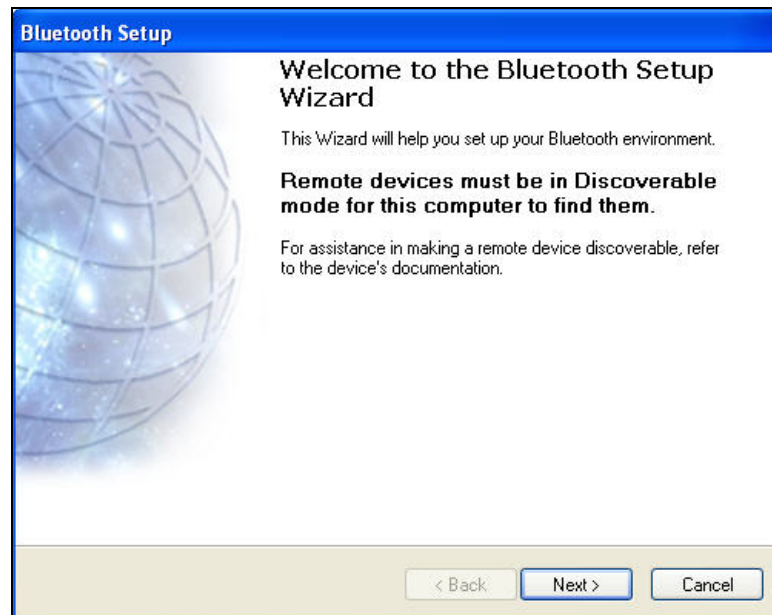
1. On the office computer, open the Control Panel. Open Bluetooth Configuration and go to the *Client Applications* tab. The following dialog appears:



2. Make sure that there is at least one Bluetooth Serial Port. To add a port, click **Add COM port** and then follow the steps through the wizard. Name the COM port appropriately and clear the *Secure Connection* check box. Click **OK** to close the Bluetooth Configuration dialog.
3. Add a Bluetooth device (click *Start / All Programs / My Bluetooth Places*):



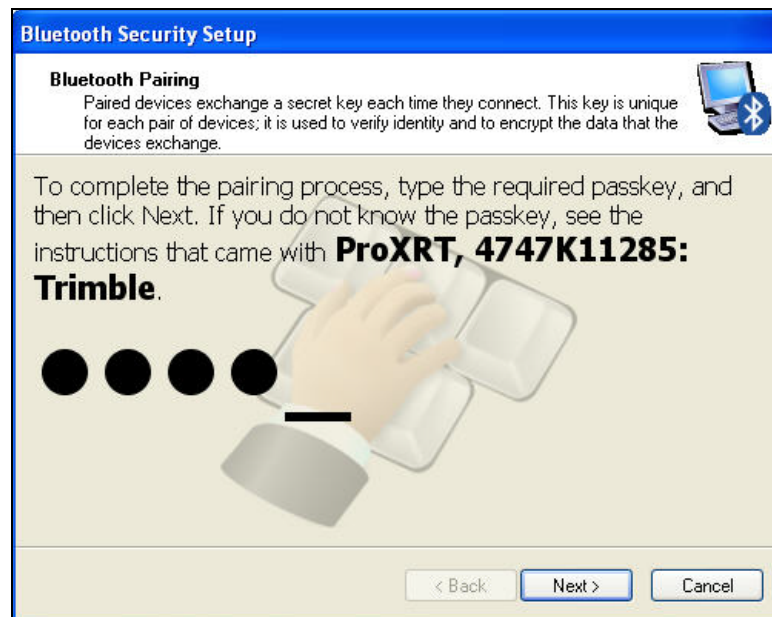
4. The *Bluetooth Setup* wizard starts. Click **Next**:



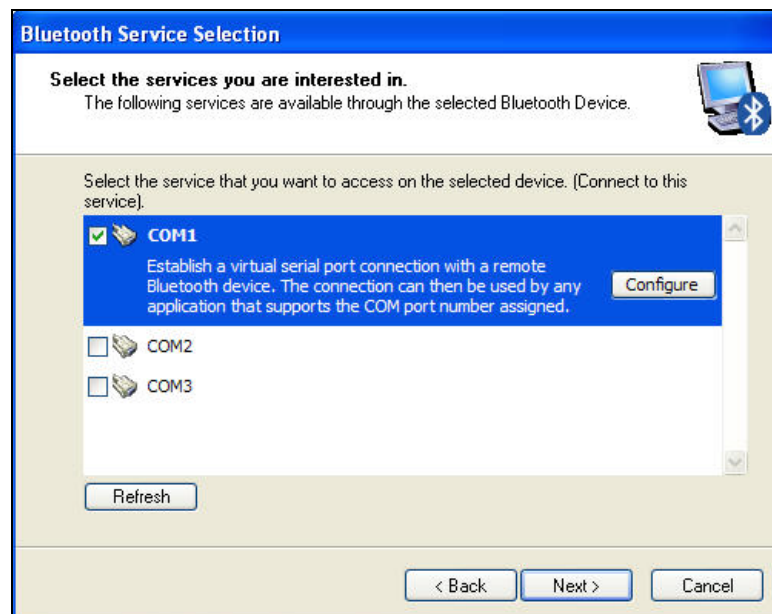
5. In the Search criteria list, change the search to Show all devices and then select the GNSS receiver that you want to connect to. Click **Next**:



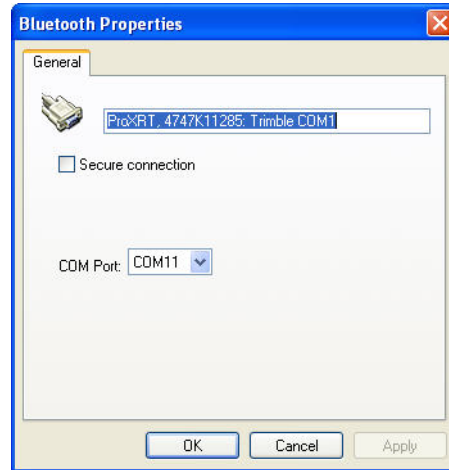
6. You are prompted for a pairing password. Enter **0000** and then click **Next**. If entered successfully you should briefly see a success page in the wizard:



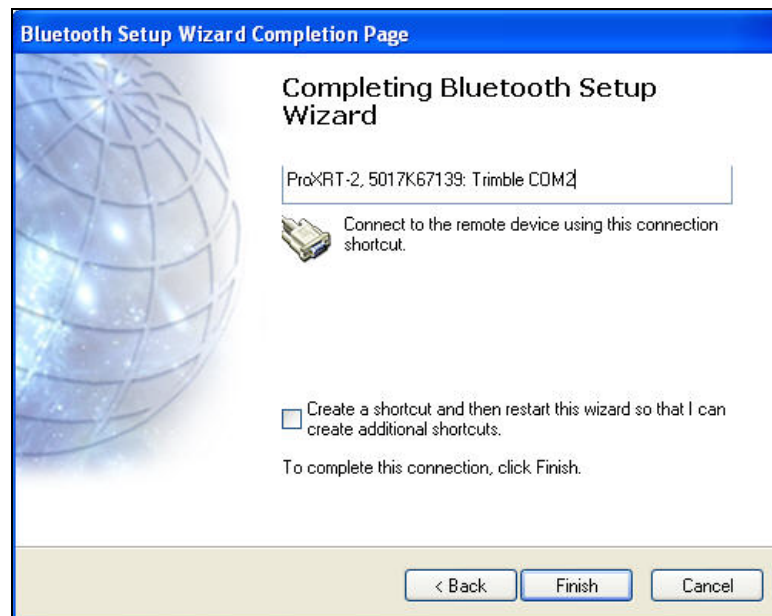
The following dialog appears:



7. Select the required COM port on your office computer and then click **Configure**. Think of Bluetooth as a cable replacement and this as the serial port on your office computer into which the Bluetooth 'cable' will be connected. The following dialog appears:

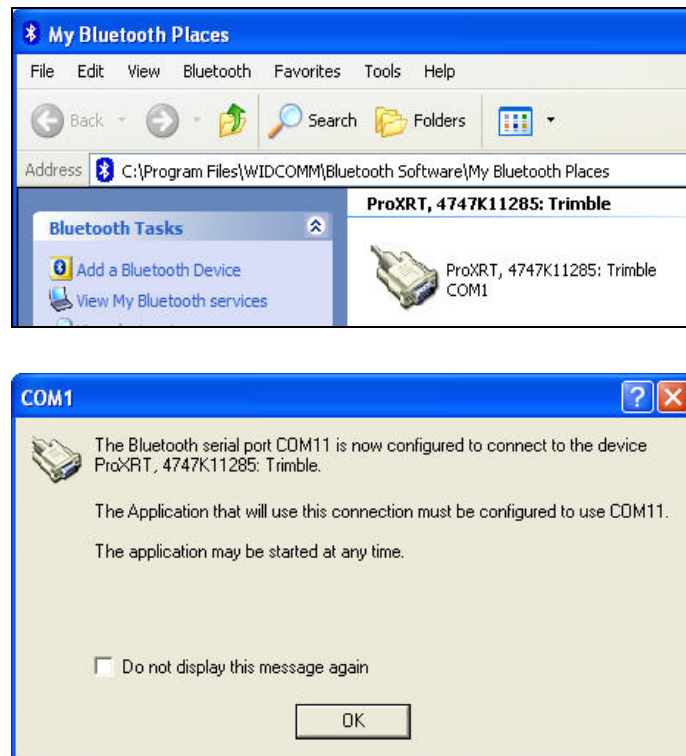


8. Ensure that the *Secure Connection* check box is cleared and then click **OK**.
9. Click **Next**. If required, change the name of the shortcut and then click **Finish**:



The new Bluetooth connection appears as a shortcut in My Bluetooth places.

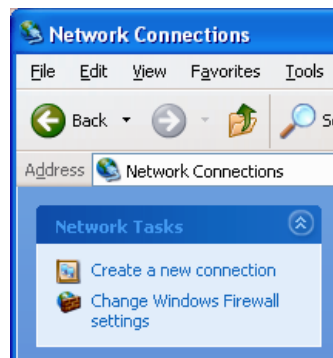
10. Double-click this icon to connect:



Creating a new connection

If your receiver is not connected to a network, but it is connected to your computer using a cable or a Bluetooth connection, you can open up the Web Browser Interface as follows:

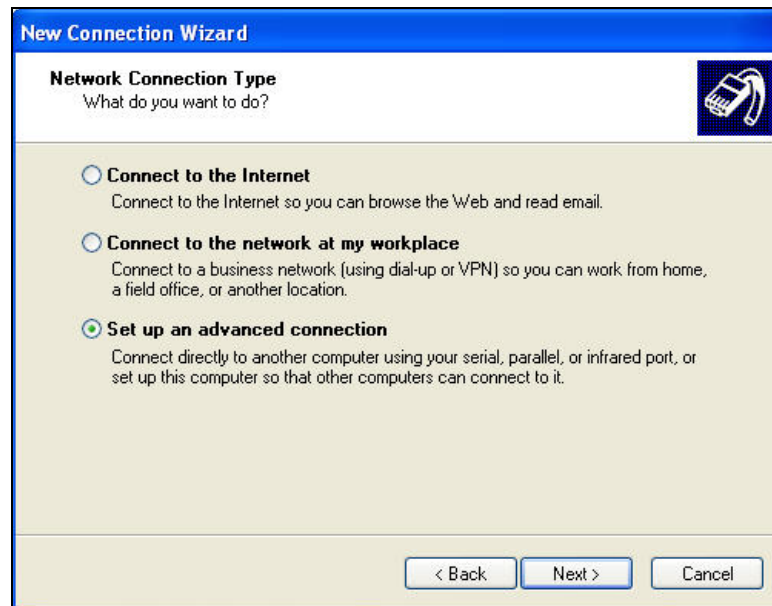
1. From your Windows Control Panel, open Network Connections and then click **Create a new connection:**



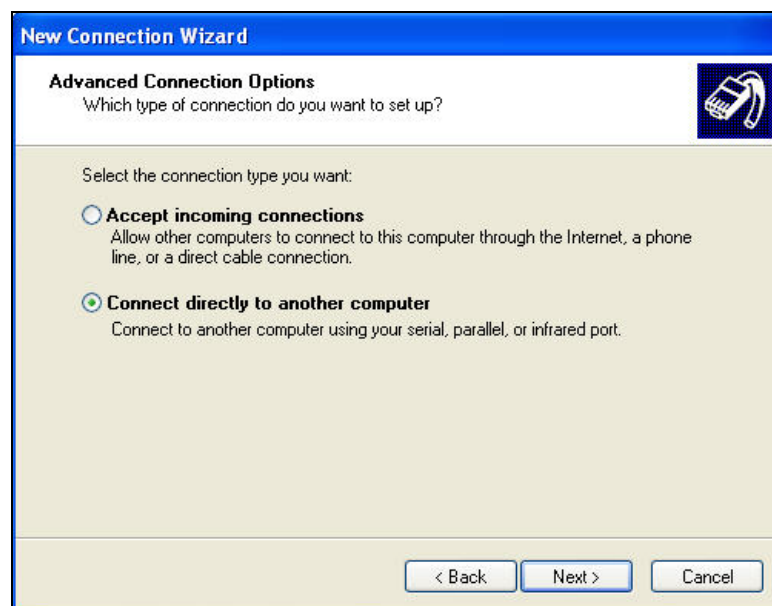
2. The *New Connection* wizard starts. Click **Next:**



3. Select *Set up an advanced connection* and then click **Next**:



4. Select *Connect directly to another computer* and then click **Next**:



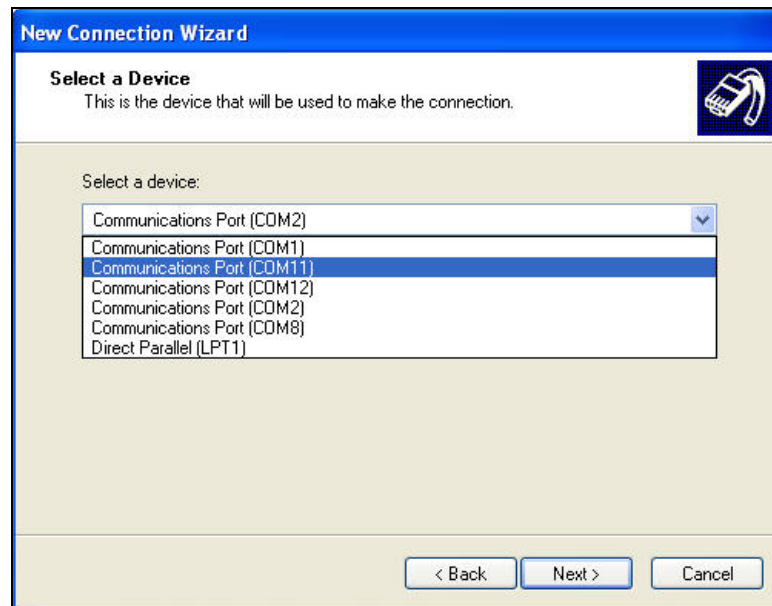
5. Select *Guest* and then click **Next**:



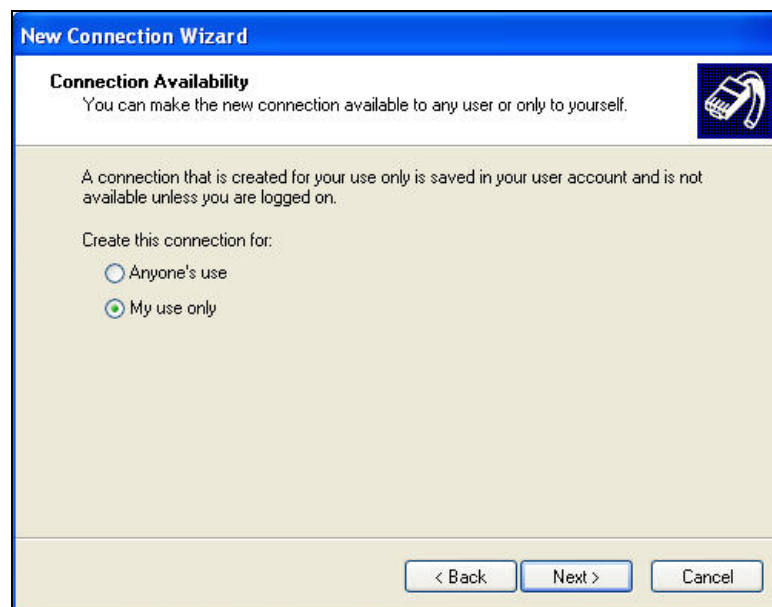
6. Give the connection a name which relates to the COM port being used on the office computer. This is like a cable connection between two computers only the cable is being replaced by a Bluetooth wireless connection. Click **Next**:



7. Select the correct COM port from the list and then click **Next**:



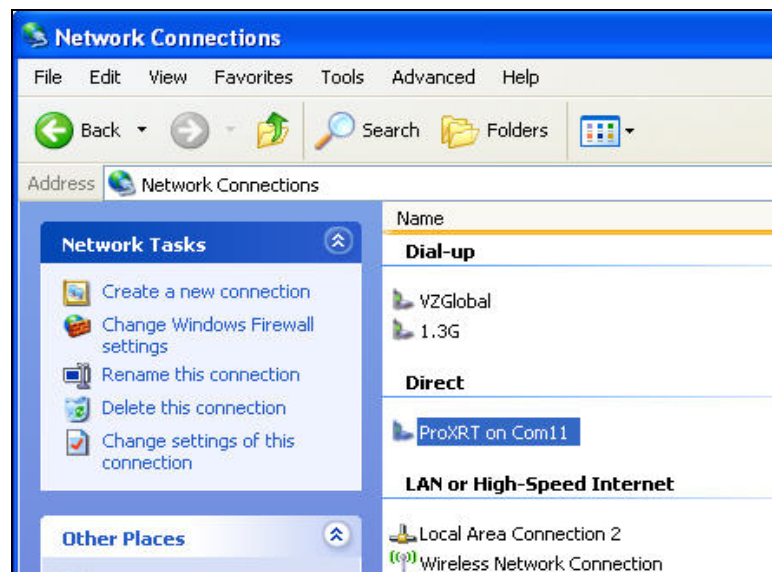
8. Specify who can use the connection and then click **Next**:



9. Click **Finish**:



10. Right-click the connection shortcut and then select *Connect*:

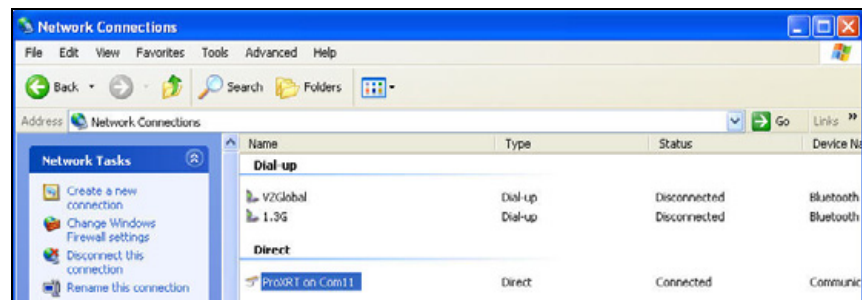


11. Enter the user name and password. The defaults for the ProXRT receiver are:
 - Username: **admin**
 - Password: **password**

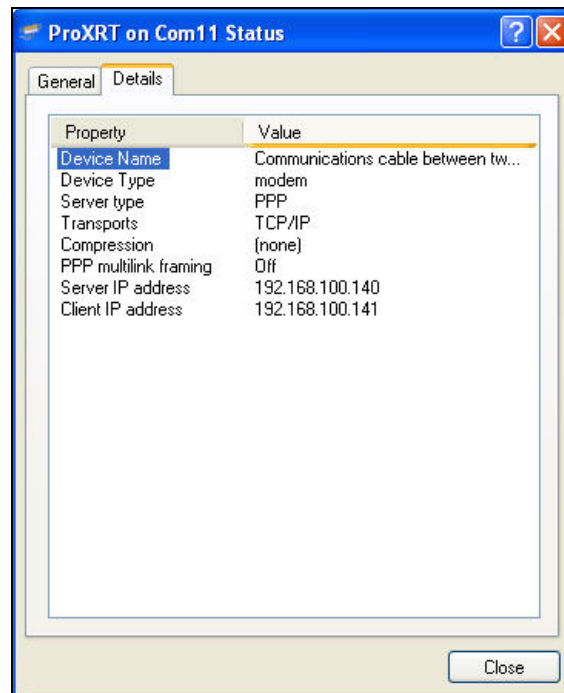
Click **Connect**:



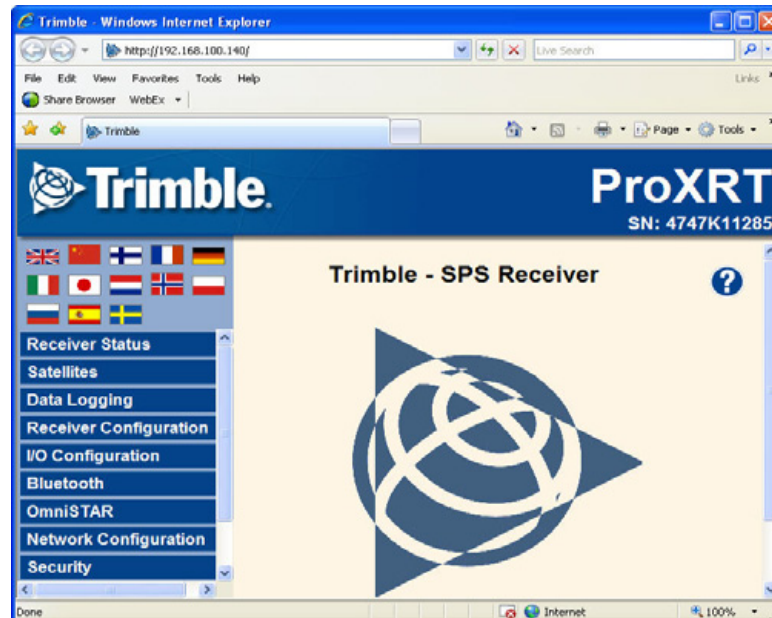
12. The new Direct connection appears in the Network Connections folder. It should now show the status as Connected:



13. Right-click on the connection and select Status:



14. The *Details* tab shows the Server IP address. Use this IP address to connect to the receiver using the web interface.



Tip – You can also get the PPP address from the front panel of the receiver by pressing  from the Home screen.

Menus

Once you are logged in, the home page appears (see [Figure 5.1](#)).

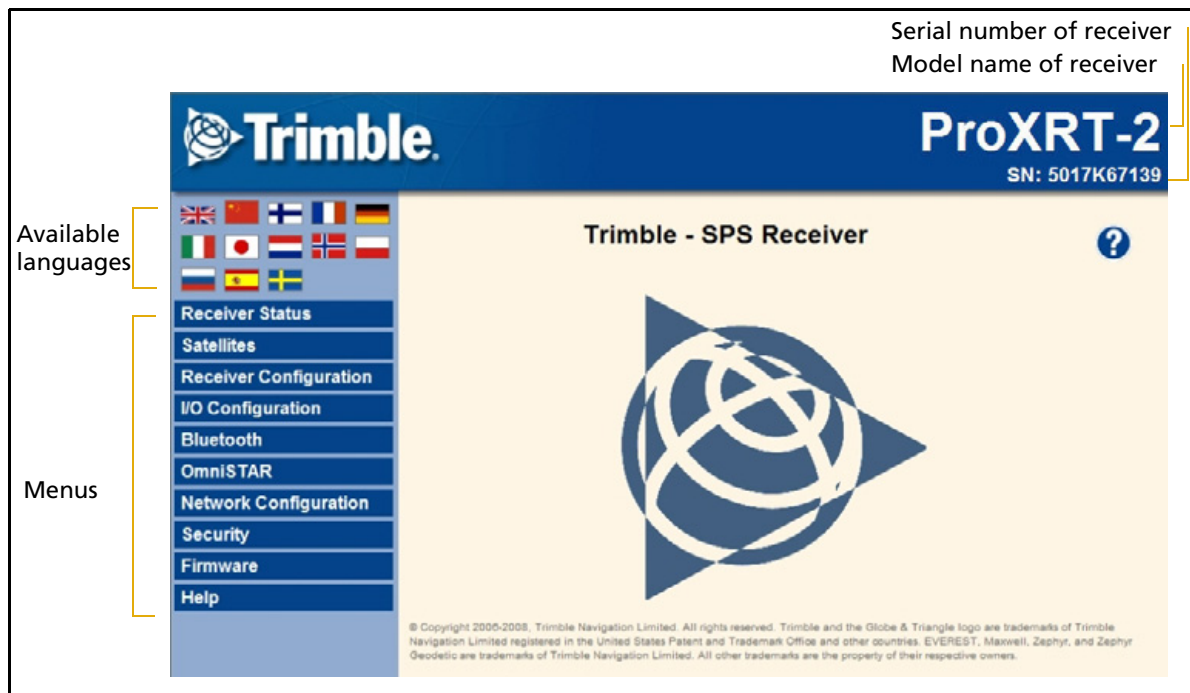


Figure 5.1 ProXRT receiver Home page

Changing the settings

Use the webpage to configure the receiver settings. The web interface shows the configuration menus on the left of the browser window, and the settings on the right. Each configuration menu contains related submenus to configure the receiver and monitor receiver performance.

Note – The configuration menus available vary based on the version of the receiver.

A summary of each configuration menu is provided here. For more detailed information about each of the receiver settings, select the *Help* menu. The Help is available whenever your computer is connected to the Internet. It is also available anytime from the Trimble website (www.trimble.com/EC_ReceiverHelp/V4.15/).

To display the web interface in another language, click the corresponding country flag. The web interface is available in the following languages:

- English (en)
- Chinese (zh)
- Dutch (nl)
- Finnish (fi)
- French (fr)
- Japanese (ja)
- Norwegian (n)
- Polish (pl)
- Russian (ru)
- Spanish (es)

- German (de)
- Italian (it)
- Swedish (sv)

Receiver Status menu

The *Receiver Status* menu provides a quick link to review the receiver's available options, current firmware version, IP address, temperature, runtime, satellites tracked, current outputs, available memory, position information, and more.

This figure shows an example of the screen that appears when you select *Receiver Status / Identity*.

Trimble ProXRT-2
SN: 5017K67139

Receiver Status - Identity

System Name:	Trimble
Serial Number:	5017K67139
Ethernet MAC Address:	00:60:35:0E:C7:CB
Ethernet IP:	10.2.129.0
DNS Resolved Name:	NONE
Bluetooth MAC Address:	00:03:19:08:59:50
Firmware Version:	4.15
Firmware Date:	2010-04-07
Monitor Version:	4.18
Hardware Version:	2.2

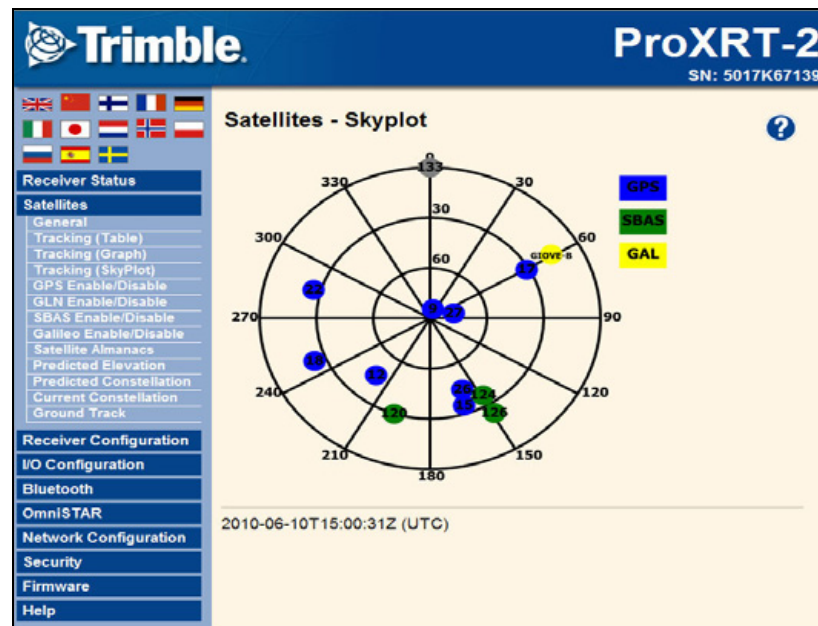
System Name:

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Satellites menu

Use the *Satellites* menu to view satellite tracking details and enable/disable GPS, GLONASS, and SBAS (WAAS, EGNOS and MSAS) satellites. You can also view the tracked Galileo GIOVE-A and GIOVE-B test satellites for signal evaluation and test purposes.

This figure shows an example of the screen that appears when you select *Satellite / Tracking (Sky Plot)*.



Receiver Configuration menu

Use the *Receiver Configuration* menu to configure settings such as elevation mask and PDOP mask, the antenna types and height, and the calibration and management of the stored configurations (Appfiles).

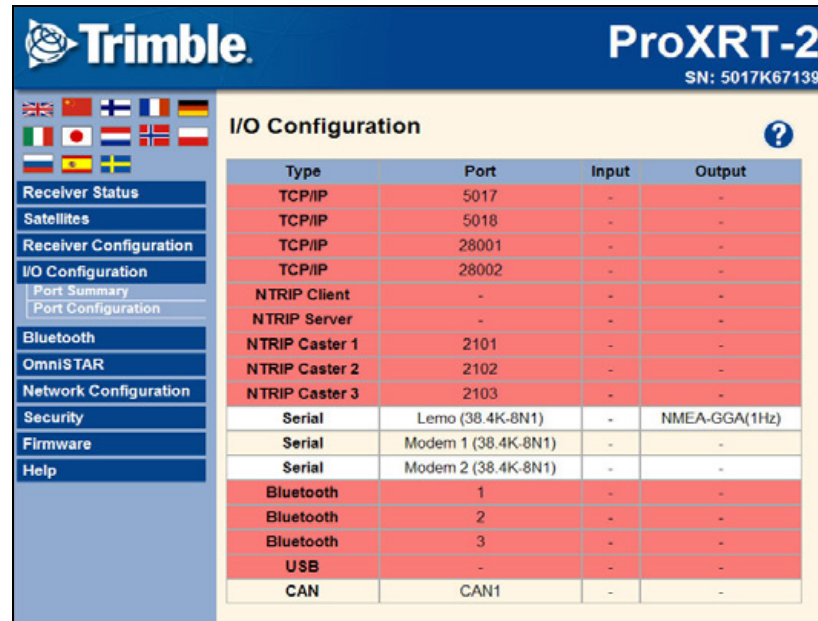
This figure shows an example of the screen that appears when you select *Receiver Configuration / Summary*.



I/O Configuration menu

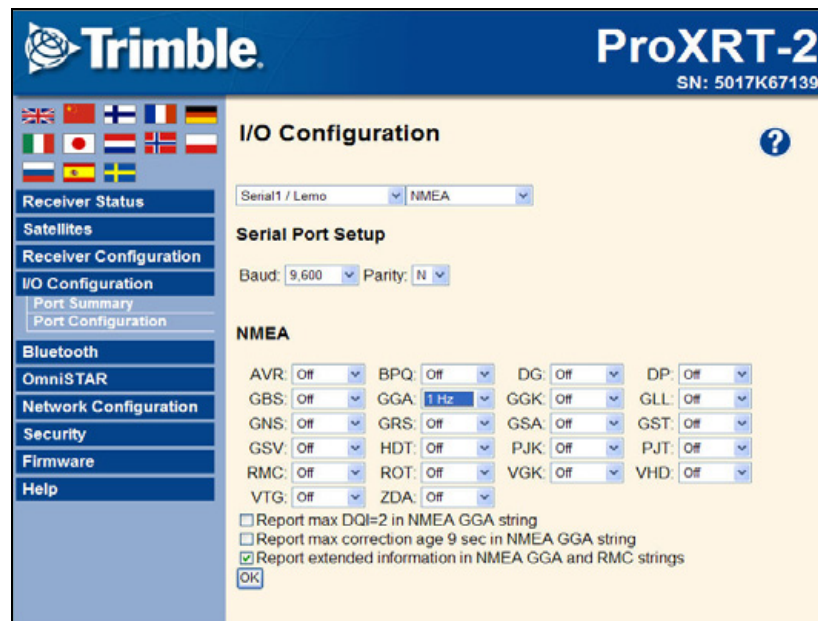
Use the *I/O Configuration* menu to set up all outputs of the receiver. The receiver can output NMEA, GSOF, or BINEX messages. These messages can be output on TCP/IP, NTRIP, UDP, serial, or Bluetooth ports.

This figure shows an example of the screen that appears when you select *I/O Configuration / Port Summary*.



Type	Port	Input	Output
TCP/IP	5017	-	-
TCP/IP	5018	-	-
TCP/IP	28001	-	-
TCP/IP	28002	-	-
NTRIP Client	-	-	-
NTRIP Server	-	-	-
NTRIP Caster 1	2101	-	-
NTRIP Caster 2	2102	-	-
NTRIP Caster 3	2103	-	-
Serial	Lemo (38.4K-8N1)	-	NMEA-GGA(1Hz)
Serial	Modem 1 (38.4K-8N1)	-	-
Serial	Modem 2 (38.4K-8N1)	-	-
Bluetooth	1	-	-
Bluetooth	2	-	-
Bluetooth	3	-	-
USB	-	-	-
CAN	CAN1	-	-

To configure the required NMEA options, select the *Port Configuration* option, or click the required port (Type) on the above screen. The following screen appears:



Serial1 / Lemo NMEA

Serial Port Setup

Baud: 9,600 Parity: N

NMEA

AVR: Off BPQ: Off DG: Off DP: Off

GBS: Off GGA: 1 Hz GGK: Off GLL: Off

GNS: Off GRS: Off GSA: Off GST: Off

GSV: Off HDT: Off PJK: Off PJT: Off

RMC: Off ROT: Off VGK: Off VHD: Off

VTG: Off ZDA: Off

☐ Report max DQI=2 in NMEA GGA string

☐ Report max correction age 9 sec in NMEA GGA string

☒ Report extended information in NMEA GGA and RMC strings

OK

1. Select the required port from the drop-down menu.
2. Select NMEA from the protocol drop-down menu.

Your Serial Port Setup values will depend on your third-party software.

3. Set the NMEA options as required, click **OK**.

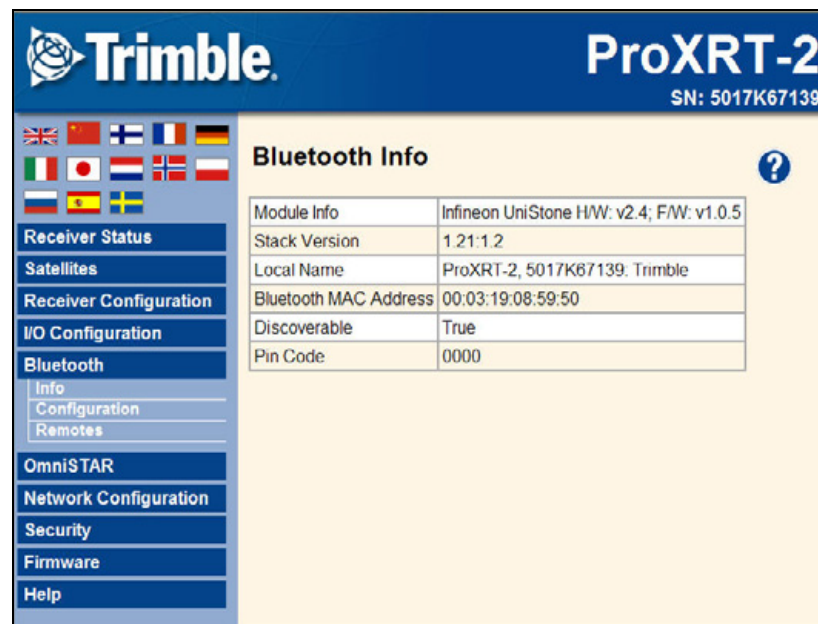
See Appendix C: NMEA-0183 Output for details of the message formats.

Bluetooth menu

Use the *Bluetooth* menu to configure the receiver to connect to other devices that use Bluetooth wireless technology. These devices can be used to configure the receiver, and generate or receive corrections. The following Trimble devices can be connected to a ProXRT receiver using Bluetooth wireless technology:

- Laptop computer
- Bluetooth-enabled field computers

This figure shows an example of the screen that appears when you select *Bluetooth / Info*.



OmniSTAR menu

All receivers can receive OmniSTAR corrections. By default, OmniSTAR tracking is turned off in the receiver. To receive OmniSTAR corrections, you must enable the receiver to track OmniSTAR satellites and it must have a valid OmniSTAR subscription. To purchase a subscription for your receiver, contact OmniSTAR at:

www.OmniSTAR.com

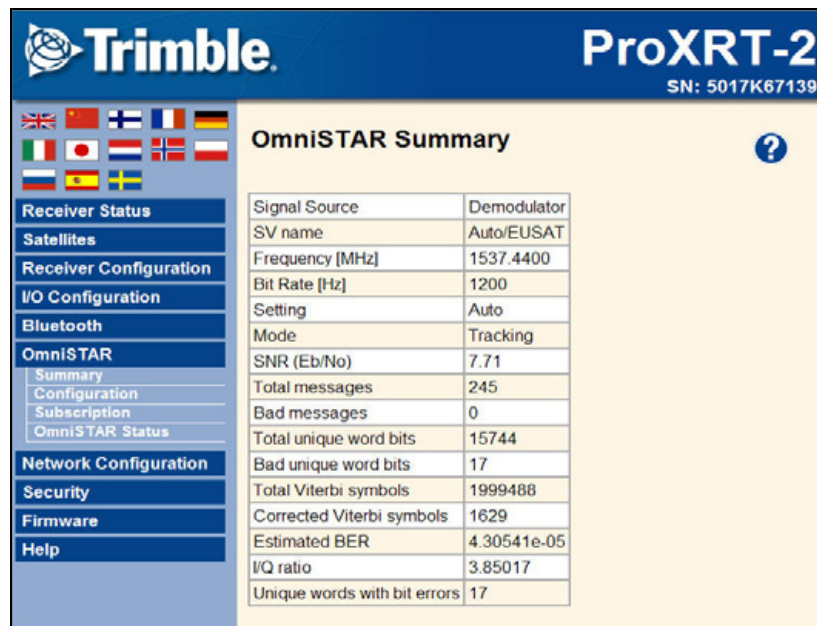
North & South America, 1-888-883-8476 or 1-713-785-5850

Europe & Northern Africa, 31-70-317-0900

Australia & Asia, 61-8-9322 5295

Southern Africa, 27 21 552 0535

This figure shows an example of the screen that appears when you select *OmniSTAR / Summary*.



Trimble ProXRT-2
SN: 5017K67139

OmniSTAR Summary ?

Signal Source	Demodulator
SV name	Auto/EUSAT
Frequency [MHz]	1537.4400
Bit Rate [Hz]	1200
Setting	Auto
Mode	Tracking
SNR (Eb/No)	7.71
Total messages	245
Bad messages	0
Total unique word bits	15744
Bad unique word bits	17
Total Viterbi symbols	1999488
Corrected Viterbi symbols	1629
Estimated BER	4.30541e-05
I/Q ratio	3.85017
Unique words with bit errors	17

Receiver Status

Satellites

Receiver Configuration

I/O Configuration

Bluetooth

OmniSTAR

- Summary
- Configuration
- Subscription
- OmniSTAR Status

Network Configuration

Security

Firmware

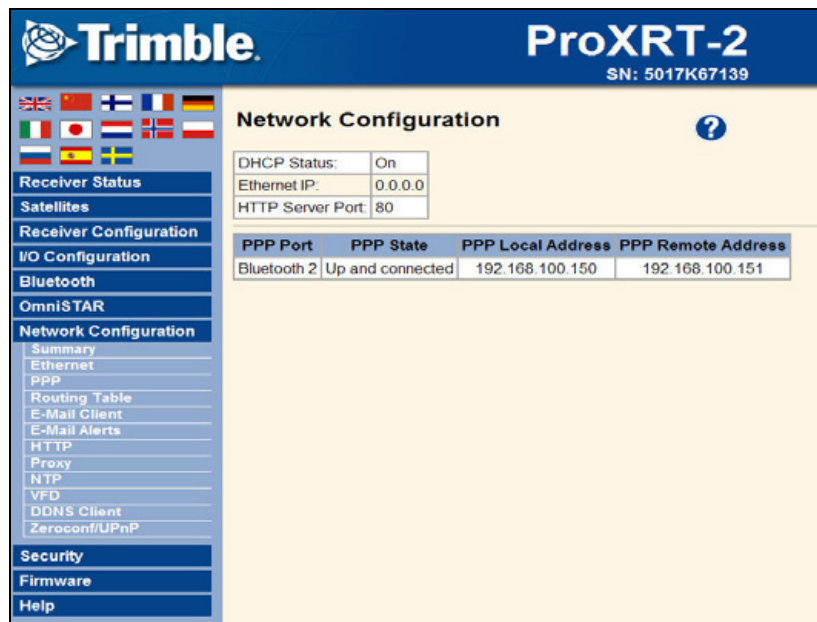
Help

Network Configuration menu

Use the *Network Configuration* menu to configure Ethernet settings, email alerts, PPP connection, HTTP port, FTP port, Dynamic DNS, and VFD port settings of the receiver. For information on the Ethernet settings, see [Configuring Ethernet settings, page 64](#).

The VFD server enables you to connect to the receiver using an unsupported Trimble utility (SPS Modular Remote Front) to view and control the receiver with a front panel display and keypad emulator. The SPS Modular Remote Front utility is available as a download from www.trimble.com. To allow the ProXRT Remote Control to connect to the receiver, you need to enable the VFD port. To do this, select *Network Configuration / VFD*.

This figure shows an example of the screen that appears when you select *Network Configuration / Network Configuration Summary*. In this example the Web Browser interface shows a Bluetooth connection to the receiver:



Security menu

Use the *Security* menu to configure the login accounts for all users who will be permitted to configure the receiver using a web browser. Each account consists of a username, password, and permissions. Administrators can use this feature to limit access to other users. Security can be disabled for a receiver. However, Trimble discourages this as it makes the receiver susceptible to unauthorized configuration changes.

This figure shows an example of the screen that appears when you select *Security / Configuration*.

Trimble ProXRT-2
SN: 5017K67139

Security Configuration

Security:

Delete?	Username	Edit User	File Download	File Delete	Receiver Config	NTripCaster
☐	admin	☒	☒	☒	☒	☒

Add User

Username:

Password:

Verify Password:

Edit User	File Download	File Delete	Receiver Config	NTripCaster
☐	☐	☐	☐	☐

Firmware menu

Use the *Firmware* menu to verify the current firmware and load new firmware to the receiver. You can upgrade firmware across a network or from a remote location without having to connect to the receiver with a serial cable.

This figure shows an example of the screen that appears when you select *Firmware*.



Help menu

For more detailed information about each of the receiver settings, select the *Help* menu. The Help is available whenever your computer is connected to the Internet. It is also available from the Trimble website,

http://www.trimble.com/EC_ReceiverHelp/V4.15/en/SPS_Help.htm

Troubleshooting

In this appendix:

- [Receiver issues](#)
- [Connection issues](#)
- [GLONASS satellite tracking issues](#)
- [Postprocessing issues](#)

Use this section to identify and solve common problems that may occur with the receiver.

Please read this section before you contact Technical Support.

Receiver issues

Issue	Possible cause	Solution
The receiver does not turn on.	External power is too low.	Check the charge on the external battery and, if applicable, check the fuse.
	Internal power is too low.	Check the charge on the internal battery.
	External power is not properly connected.	Check that the Lemo connector or 26-pin adaptor is seated correctly, and that the cable is secured to the receiver.
		Check for broken or bent pins in the connector.
	Faulty power cable.	Check that you are using the correct cable for the port/battery.
		Check that the correct battery is connected to a particular port. The ports on the GNSS receiver are optimized for use with different types of battery. The 26-pin connector is optimized for Trimble custom external batteries, and the Lemo port is optimized for external 12 V batteries such as car, motorcycle, or truck batteries. If the wrong type of battery is connected to a port, it is likely that it will cut off earlier than normal.
		Check pinouts with a multimeter to ensure internal wiring is intact.
The receiver is not responding.	Receiver needs a soft reset.	Turn off the receiver and then turn it back on again. See Power button operations, page 25 .
	Receiver needs a full reset.	Press  for 30 seconds. See Power button operations, page 25 .
The receiver is not receiving satellite signals.	The GNSS antenna cable is loose.	Make sure that the GNSS antenna cable is tightly seated in the GNSS antenna connection on the GNSS antenna.
	The cable is damaged.	Check the cable for any signs of damage. A damaged cable can inhibit signal detection from the antenna at the receiver.
	The GNSS antenna is not in clear line of sight to the sky.	- Make sure that the GNSS antenna is located with a clear view of the sky. - As a last resort, perform a soft reset (two seconds) and then a 15-second satellite information reset. See Power button operations, page 25.
The message PC Loader in Control appears on the front panel.	The WinFlash utility is in use.	Complete the WinFlash task and then exit the utility.
	The WinFlash utility was started then the data cable was disconnected.	Plug the data cable back in and then restart the receiver.
	No apparent reason.	- If the WinFlash utility is not in use, turn off the receiver using the Power key. - If that does not clear the message, apply external DC power and hold down the Power key for 60 seconds.

Connection issues

Issue	Possible cause	Solution
The receiver will not connect to a field computer or to an external correction source.	The port is locked by previous use.	Reset both the receiver and the other device. See Power button operations, page 25
	The receiver is not turned on.	Turn on the receiver and reconnect using the supported Trimble GNSS field software.
	The software does not support the GPS Pathfinder ProXRT receiver, or is not the correct version.	Make sure that you are using the correct software and version. See Supported GNSS field software, page 50 .
	The baud rate is not set correctly.	Reset the receiver to the factory default settings. See Power button operations, page 25 .

GLONASS satellite tracking issues

Issue	Possible cause	Solution
GLONASS satellites are not being used in the real-time solution.	The base station being used may not be GLONASS-capable.	The base station used must be able to receive data from GLONASS satellites.
	The GLONASS option for the receiver is not installed.	Contact your Trimble reseller to purchase the upgrade and then use the WinFlash utility to load the option onto the receiver.
	The <i>Use GLONASS</i> option in the GNSS field software is disabled.	In the Trimble GNSS field software, go to the <i>GPS Settings</i> form and then set the <i>Use GLONASS</i> option to Auto.

Postprocessing issues

Issue	Possible cause	Solution
The postprocessed results differ from the real-time corrected results.	GLONASS satellites were used in real-time but not during postprocessing.	For versions of the GPS Pathfinder Office software earlier than 4.20, GLONASS measurements are not used in postprocessing. To ensure that GLONASS measurements are used in the solution, use the real-time positions. For GPS Pathfinder Office software version 4.20 and later, the postprocessing engine supports GLONASS positions. To use corrected positions, connect to a real-time differential correction source.
Accurate real-time positions were achieved in the field, but the data will not postprocess.	There are not enough satellites to enable postprocessing. This can occur if GLONASS satellites are used in the real time solution.	Use the real time solution. For versions of the GPS Pathfinder Office software earlier than 4.20, GLONASS measurements are not used in postprocessing. For GPS Pathfinder Office software version 4.20 and later, the postprocessing engine supports GLONASS positions.

Understanding GNSS

In this chapter:

- What is GPS?
- What is GLONASS?
- Best practice guidelines for setting up the receiver
- Collecting real-time H-Star data
- Differential correction explained

This section provides a basic introduction to GNSS and associated concepts referred to in this user guide.

What is GPS?

The Global Positioning System (GPS) is a global navigation satellite system (GNSS) that allows you to calculate your location anywhere in the world using satellite signals. The GPS system was set up by the United States government and is a constellation of operational NAVSTAR satellites that orbit the earth every 12 hours. This system provides worldwide, all-weather, 24-hour time and position information.

***Note** – To receive signals from GNSS satellites, the antenna must have a clear view of the sky. GNSS positions may not always be available, particularly in or near buildings, in vehicles, or under tree canopy.*

What is GLONASS?

The GLObal Navigation Satellite System (GLONASS) is a global navigation satellite system (GNSS) that allows you to calculate your location using satellite signals. The GLONASS system was developed by the former Soviet Union and is now operated for the Russian government by the Russian Space Forces. Currently, the Russian government aims to restore the system to provide global coverage by 2009.

***Note** – To receive signals from GNSS satellites, the antenna must have a clear view of the sky. GNSS positions may not always be available, particularly in or near buildings, in vehicles, or under tree canopy.*

Best practice guidelines for setting up the receiver

For good receiver operation, observe the following equipment setup guidelines:

- Use the GNSS antenna in a location that has a clear line-of-sight to the sky in all directions. To maximize accuracy and productivity, avoid using the antenna near vertical obstructions such as buildings, deep cuttings, site vehicles, towers, or tree canopy. GNSS rovers and the base station receive the same satellite signals from the same satellites. The system needs four common satellites to provide differentially corrected positions, and five common satellites to provide decimeter real-time H-Star positions.
- Place the GNSS antenna as high as possible to minimize multipath from the surrounding area. The receiver must have a clear line-of-sight to the sky at all times during operation.

- GNSS satellites are constantly moving. Because you cannot measure at a specific location now does not mean that you will not be able to measure there later, when satellite coverage at the location improves. Use GNSS planning software to identify the daily best and worst satellite coverage times for your location and then choose measurement times that coincide with optimal GNSS performance. This is especially important when operating in the worst GNSS locations. You can use the Plan form in the Status section of the TerraSync software to plan up to 12 hours in advance, or you can use the Trimble Planning software which you can download from the Trimble website (www.trimble.com/planningsoftware_ts.asp).
- Loss of the satellite signals or loss of the radio link or VRS network connection results in a loss of decimeter position accuracy.
- Make sure that the receiver does not lose power. Usually, the receiver is powered by its internal battery. You cannot change the battery, but the charge normally lasts for longer than a working day. If you do not use the receiver very often, ensure that it is charged at least every three months.
- Do not locate the receiver or antenna within 400 meters (about 1,300 ft) of powerful radar, television, cellular communications tower, or other transmitters or GNSS antennas. Low-power transmitters, such as those in cellular phones and two-way radios, normally do not interfere with receiver operations. Cellular communication towers can interfere with the radio and can interfere with GNSS signals entering the receiver. This does not harm the receiver, but it can prevent the receiver electronics from functioning correctly.
- Do not use the rover receiver directly beneath or close to overhead power lines or electrical generation facilities. The electromagnetic fields associated with these utilities can interfere with GNSS receiver operation. Other sources of electromagnetic interference include:
 - gasoline engines (spark plugs)
 - televisions and computer monitors
 - alternators and generators
 - electric motors
 - equipment with DC-to-AC converters
 - fluorescent lights
 - switching power supplies
- If you are using the rover receiver in open spaces, Trimble recommends that you stop work during electrical storms where the risk of lightning strike is high.
- Where cables are involved, Trimble recommends that you use cable ties to secure the cables to the pole or other equipment to avoid inadvertent snagging while moving about the jobsite. Be careful not to kink, twist, or unnecessarily extend cables, and avoid trapping them in vehicle doors or windows. Damage to cables can reduce the performance of GNSS equipment.

Collecting real-time H-Star data

The GPS Pathfinder ProXRT receiver can be used to collect positions using real-time H-Star technology, with accuracy varying from decimeter (10 cm) to subfoot (30 cm).

To collect real-time H-Star data, you must:

- Connect to an external correction source, such as a VRS network, using a cellular phone, and maintain this link while collecting data. For more information, see [Connecting a Bluetooth-enabled cellular phone for real-time corrections from an Internet source \(including VRS networks\)](#), page 38.
- Use dual-frequency base station(s).
- When inside the coverage area of a VRS network, or when using a single base station at a baseline length less than 30 km, the receiver typically achieves decimeter-level accuracy. At baselines of between 30 km and 80 km, you can expect accuracy in the subfoot range (30 cm).
- To obtain a real-time solution with decimeter accuracy using H-Star technology, the receiver must track at least five satellites that the base station is also tracking. In a dual-constellation operation, for example GPS and GLONASS, the receiver must track at least six satellites.
- To maintain a real-time solution with decimeter accuracy using H-Star technology, the rover must continuously track at least four satellites that the base station is also tracking. In a dual-satellite constellation operation, for example, GPS and GLONASS, the receiver must track at least five satellites. The radio link between the base and rover receivers must also be maintained.

Differential correction explained

Use differential correction to correct errors in your collected data. Differential correction requires one or more additional receivers, called base stations or reference stations, which are located at known points. Data collected at the base stations is used to determine GNSS measurement errors and compute corrections to these errors. An unlimited number of mobile GNSS receivers, called **rovers**, collect GNSS data at unknown locations within the vicinity of the base station. Errors common at both the base station and the rover receiver are corrected either in real time or during postprocessing.

Real-time differential correction

With real-time differential correction, the base station calculates and broadcasts the error for each satellite as each measurement is received, enabling you to apply corrections while in the field and collect accurate GNSS data. Real-time differential corrections are available from a variety of public and commercial sources. They can be generated and broadcast in real-time by privately or self-owned base providers, or by a wide range of government agencies.

Real-time differential correction sources include external beacon and radio sources, Satellite-Based Augmentation Systems (SBAS) such as WAAS in the US and EGNOS in Europe, OmniSTAR differential correction services, and VRS networks. SBAS, OmniSTAR services and VRS networks use multiple reference stations in the network to calculate the corrections that are then delivered to the receiver from a Geostationary satellite (SBAS), satellite signal (OmniSTAR) or from a radio or cellular phone (VRS networks).

Factors that affect real-time corrected accuracy include how often the corrections are updated, how far you are from the reference station, and whether the coordinate system used by the correction source matches the coordinate system used by the GNSS receiver.

Postprocessed differential correction

With postprocessed differential correction, the collected GNSS data is transferred to an office computer, and measurements from the reference station are downloaded. Postprocessing software such as the GPS Pathfinder Office software or the Trimble GPS Analyst extension for ESRI ArcGIS Desktop software is used to differentially correct the collected data.

Note – For versions of the GPS Pathfinder Office software earlier than 4.20, when the Auto option is selected, it is possible that autonomous or real-time corrected positions that were calculated in the field may fail to be corrected during postprocessing. This is because positions in the field are calculated using both GLONASS and GPS measurements, but the postprocessed positions are calculated using GPS measurements only. If you require every GNSS position in the field to have a matching postprocessed position in the office, select No in the Use GLONASS field.

For GPS Pathfinder Office software version 4.20 and later, the postprocessing engine supports GLONASS positions

Typically, postprocessed differential correction uses only one base station. However, when differentially correcting data collected with GPS Pathfinder ProXRT receivers using H-Star technology, you can select multiple base stations to correct the file against for improved accuracy.

Factors that affect the accuracy of postprocessed differential correction include the type of receiver and antenna used at the reference station, the distance between the base station and the location where the rover data was collected, the accuracy of the base station position, and the logging interval at the base station.

For more information, refer to the documentation provided with the postprocessing software.

Postprocessed real-time differential correction

If your data files contain autonomous (uncorrected) positions as well as real-time corrected positions, Trimble recommends that you postprocess the data. During postprocessing, you can choose whether to correct only autonomous positions, or all positions. In general, recorrecting positions corrected in real-time will have little effect on the accuracy of your data.

Note – For versions of the GPS Pathfinder Office software earlier than 4.20, when the Auto option is selected, it is possible that autonomous or real-time corrected positions that were calculated in the field may fail to be corrected during postprocessing. This is because positions in the field are calculated using both GLONASS and GPS measurements, but the postprocessed positions are calculated using GPS measurements only. If you require every GNSS position in the field to have a matching postprocessed position in the office, select No in the Use GLONASS field.

For GPS Pathfinder Office software version 4.20 and later, the postprocessing engine supports GLONASS positions.

China RoHS Information

In this chapter:

- [Date of manufacture](#)
- [China RoHS information table](#)

This section provides information regarding China RoHS requirements for the GPS Pathfinder ProXRT receiver.

Date of manufacture

The date of manufacture is coded into the serial number of the GPS Pathfinder ProXRT receiver.

The serial number structure is YYWWLNNNNN

Where:

- YY = year of manufacture (*Gregorian calendar year minus 1960*)
- WW = week of manufacture (*week number*)
- L = manufacturing location
- NNNNN = sequential number of unit

Example serial number: 4808501234

- Year of manufacture 4808501234 = 2008
- Week of manufacture 4808501234 = week number 8

China RoHS information table (中国 RoHS 符合性信息表)

部件名称 Part	有毒有害物质和元素 (Hazardous substances and elements)						在友好环境中使用 Environmental Friendly Use Period
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Chromium VI Compounds (Cr6+)	多溴联苯 Polybrominated Biphenyls (PBB)	多溴二苯醚 Polybrominated Diphenyl Ethers (PBDE)	
85340-02	X	0	0	0	0	0	10
58957-02	X	0	0	0	0	0	10
78650	X	0	0	0	0	0	10
78651	X	0	0	0	0	0	10
57168	X	0	0	0	0	0	10
59043	X	0	0	0	0	0	10
59046	X	0	0	0	0	0	10

说明:

0: 表示有毒有害物质在该部件所有均质材料中的含量都在 SJ/T11363-2006 标准规定的限量要求以下。

0: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: 表示有毒有害物质在该部件至少一种均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

NMEA-0183 Output

In this appendix:

- [NMEA-0183 message overview](#)
- [Common message elements](#)
- [NMEA messages](#)

This appendix describes the formats of the subset of NMEA-0183 messages that are available for output by the ProXRT receiver when the NMEA Output option is installed.

For a copy of the NMEA-0183 Standard, go to the National Marine Electronics Association website at www.nmea.org.

NMEA-0183 message overview

When NMEA-0183 output is enabled, a subset of NMEA-0183 messages can be output to external instruments and equipment connected to the receiver serial ports. These NMEA-0183 messages let external devices use selected data collected or computed by the GNSS receiver.

All messages conform to the NMEA-0183 version 3.01 format. All begin with \$ and end with a carriage return and a line feed. Data fields follow comma (,) delimiters and are variable in length. Null fields still follow comma (,) delimiters but contain no information.

An asterisk (*) delimiter and checksum value follow the last field of data contained in an NMEA-0183 message. The checksum is the 8-bit exclusive of all characters in the message, including the commas between fields, but not including the \$ and asterisk delimiters. The hexadecimal result is converted to two ASCII characters (0–9, A–F). The most significant character appears first.

The following table summarizes the set of NMEA messages supported by the receiver, and shows the page that contains detailed information about each message.

Message	Functions	Page
ALM	Almanac data	page 105
GBS	GNSS satellite fault detection	page 106
GGA	Time, position, and fix related data	page 107
GLL	Geographic position; Latitude and Longitude	page 108
GNS	GNSS fix data	page 109
GRS	GPS range residuals	page 110
GSA	GPS DOP and active satellites	page 111
GST	Position error statistics	page 112
GSV	Number of SVs in view, PRN, elevation, azimuth, and SNR	page 113
HDT	Heading from True North	Not applicable for this receiver
PJT	Projection type	page 114
PTNL,AVR	Time, yaw, tilt, range, mode, PDOP, and number of SVs for Moving Baseline RTK	Not applicable for this receiver
PTNL, BPQ	Base station position and position quality indicator	Not applicable for this receiver
PTNL, DG	L-band corrections and beacon signal strength and related information	Not applicable for this receiver
PTNL,GGK	Time, position, position type and DOP values	page 115
PTNL,PJK	Local coordinate position output	Not applicable for this receiver
PTNL,VGK	Time, locator vector, type and DOP values	Not applicable for this receiver
PTNL,VHD	Heading Information	Not applicable for this receiver
RMC	Position, Velocity, and Time	page 116

Message	Functions	Page
ROT	Rate of turn	Not applicable for this receiver
VTG	Actual track made good and speed over ground	page 117
ZDA	UTC day, month, and year, and local time zone offset	page 118

To configure the output of individual NMEA messages, use the TerraSync software's GSP Settings form in the Setup section, or the receiver's Web Browser interface. See [Configuring the Receiver Using the Web Browser Interface](#).

Common message elements

Each message contains:

- a message ID consisting of *\$GP* followed by the message type. For example, the message ID of the GGA message is *\$GPGGA*.
- a comma
- a number of fields, depending on the message type, separated by commas
- an asterisk
- a checksum value

Below is an example of a simple message with a message ID (*\$GPGGA*), followed by 13 fields and a checksum value:

```
$GPGGA,172814.0,3723.46587704,N,12202.26957864,W,2,6,1.2,18.893,M,-
25.669,M,2.0,0031*4F
```

Message values

NMEA messages that the receiver generates contains the following values.

Latitude and longitude

Latitude is represented as *ddmm.mmmm* and longitude is represented as *dddmm.mmmm*, where:

- *dd* or *ddd* is degrees
- *mm.mmmm* is minutes and decimal fractions of minutes

Direction

Direction (north, south, east, or west) is represented by a single character: *N*, *S*, *E*, or *W*.

Time

Time values are presented in Universal Time Coordinated (UTC) and are represented as *hhmmss.cc*, where:

- *hh* is hours, from 00 through 23
- *mm* is minutes

- *ss* is seconds
- *cc* is hundredths of seconds

NMEA messages

When NMEA-0183 output is enabled, the following messages can be generated.

ALM **Almanac data**

An example of the ALM message string is shown below. [Table C.1](#) describes the message fields.

\$GPALM,A,B,C,D,E,F,hh,hhhh,...

Table C.1 ALM message fields

Field	Meaning
0	Message ID \$GPALM
1	Total number of messages
2	Message number
3	Satellite PRN number
4	GPS week number (0 - 1023)
5	Satellite health (bits 17-24 of message)
6	Eccentricity
7	t index OA, almanac reference time
8	sigma index 1, inclination angle
9	OMEGADOT rate of right ascension SQRA(A) root of semi-major axis Omega, argument of perigee Omega index 0, longitude of ascension node M index 0, mean anomaly a index f0, clock parameter a index f1, clock parameter

GBS**GNSS satellite fault detection**

An example of the GBS message string is shown below. [Table C.2](#) describes the message fields.

\$GPGBS,015509.00,-0.031,-0.186,0.219,19,0.000,-0.354,6.972*4D

Table C.2 GBS message fields

Field	Meaning
0	Message ID \$GPGBS
1	UTC of position fix
2	Expected error in latitude ¹
3	Expected error in longitude ¹
4	Expected error in altitude ¹
5	ID number of most likely failed satellite
6	Probability of missed detection for most likely failed satellite
7	Estimate of bias in meters on most likely failed satellite
8	Standard deviation of bias estimates
9	The checksum data, always begins with *

¹Expected error in meters due to bias, with noise = 0.

GGA Time, Position, and Fix Related Data

An example of the GGA message string is shown below. [Table C.3](#) describes the message fields.

Note – *The following data string exceeds the NMEA standard length.*

```
$GPGGA,172814.0,3723.46587704,N,12202.26957864,W,  
2,6,1.2,18.893,M,-25.669,M,2.0,0031*4F
```

Table C.3 GGA message fields

Field	Meaning
0	Message ID \$GPGGA
1	UTC of position fix
2	Latitude
3	Direction of latitude: N: North S: South
4	Longitude
5	Direction of longitude: E: East W: West
6	GPS Quality indicator: 0: Fix not valid 1: GPS fix 2: Differential GPS fix, OmniSTAR VBS 4: Real-Time Kinematic, fixed integers 5: Real-Time Kinematic, float integers, OmniSTAR XP/HP or Location RTK
7	Number of SVs in use, range from 00 through to 24+
8	HDOP
9	Orthometric height (MSL reference)
10	M: unit of measure for orthometric height is meters
11	Geoid separation
12	M: geoid separation is measured in meters
13	Age of differential GPS data record, Type 1 or Type 9. Null field when DGPS is not used.
14	Reference station ID, ranging from 0000 through 1023. A null field when any reference station ID is selected and no corrections are received ¹ .
15	The checksum data, always begins with *

¹When using OmniSTAR services, ID=100 for OmniSTAR VBS, ID=1000 for OmniSTAR HP, ID=1008 for OmniSTAR XP, and ID = 1012 / 1013 / 1020 / 1021 for OmniSTAR G2.

GLL Geographic position: Latitude and Longitude

An example of the GLL message string is shown below. [Table C.4](#) describes the message fields.

```
$GPGLL,<1>,<2>,<3>,<4>,<5>,<6>*<7><CR><LF>
```

Table C.4 GLL message fields

Field	Meaning
0	Message ID \$GPGLL
1	Latitude 3723.2475 ddmm.mmmm
2	N/S Indicator. N=north or S=south
3	Longitude 12158.3416 dddmm.mmmm
4	E/W indicator E=east or W=west
5	UTC position 161229.487 hhmmss.sss
6	Status. A=data valid or V=data not valid
7	Checksum *2C

GNS GNSS fix data

An example of the GNS message string is shown below. [Table C.5](#) describes the message fields.

```
$GPGNS,hhmmss.ss,lll.ll,a,yyyy.yy,a,c,xx,x.x,x.x,x.x,x.x,x.x*hh<CR>LF>
```

Table C.5 GNS message fields

Field	Meaning
0	Message ID \$GPGNS
1	UTC of position
2	Latitude
3	North / South
4	Longitude
5	East / West
6	Mode indicator ¹
7	Total number of satellites in use, 00-99
8	HDOP
9	Antenna altitude, meters, re:mean-sea-level (geoid)
10	Geoidal separation, meters
11	Age of differential data
12	Differential reference station ID

¹Mode indicator. A variable length valid character field type with the first two characters currently defined: the first indicates the use of GPS satellites, the second the use of GLONASS satellites. Future satellite systems would be added on the right.

GRS**GPS range residuals**

An example of the GRS message string is shown below. [Table C.6](#) describes the message fields.

```
$GPGRS,220320.0,0,-0.8,-0.2,-0.1,-0.2,0.8,0.6,,,,,,*55
```

Table C.6 GRS message fields

Field	Meaning
0	Message ID \$GPGRS
1	UTC time of the GGA position fix
2	Residuals 0: Residuals used to calculate the position given in the matching GGA line 1: Residuals recomputed after the GGA position was computed
3-14	Range residuals for satellites used in the navigation solution, in meters

GSA **GPS DOP and active satellites**

An example of the GSA message string is shown below. [Table C.7](#) describes the message fields.

```
$GPGSA,<1>,<2>,<3>,<3>,,,,,<3>,<3>,<3>,<4>,<5>,<6>*<7><CR><LF>
```

Table C.7 GSA message fields

Field	Meaning
0	Message ID \$GPGSA
1	Mode 1, M = manual, A = automatic
2	Mode 2, Fix type, 1 = not available, 2 = 2D, 3 = 3D
3	PRN number, 01 through 32 for GPS, 33 to 64 for SBAS, 64+ for GLONASS
4	PDOP-Position dilution of precision, 0.5 through 99.9
5	HDOP-Horizontal dilution of precision, 0.5 through 99.9
6	VDOP-Vertical dilution of precision, 0.5 through 99.9
7	The checksum data, always begins with *

GST Position Error Statistics

An example of the GST message string is shown below. [Table C.8](#) describes the message fields.

```
$GPGST,172814.0,0.006,0.023,0.020,273.6,0.023,0.020,0.031*6A
```

Table C.8 GST message fields

Field	Meaning
0	Message ID \$GPGST
1	UTC of position fix
2	RMS value of the pseudorange residuals; includes carrier phase residuals during periods of RTK(float) and RTK(fixed) processing
3	Error ellipse semi-major axis 1 sigma error, in meters
4	Error ellipse semi-minor axis 1 sigma error, in meters
5	Error ellipse orientation, degrees from true north
6	Latitude 1 sigma error, in meters
7	Longitude 1 sigma error, in meters
8	Height 1 sigma error, in meters
9	The checksum data, always begins with *

GSV **Satellite Information**

The GSV message string identifies the number of SVs in view, the PRN numbers, elevations, azimuths, and SNR values. An example of the GSV message string is shown below. [Table C.9](#) describes the message fields.

\$GPGSV,4,1,13,02,02,213,,03,-3,000,,11,00,121,,14,13,172,05*67

Table C.9 GSV message fields

Field	Meaning
0	Message ID \$GPGSV
1	Total number of messages of this type in this cycle
2	Message number
3	Total number of SVs visible
4	SV PRN number
5	Elevation, in degrees, 90° maximum
6	Azimuth, degrees from True North, 000° through 359°
7	SNR, 00–99 dB (null when not tracking)
8–11	Information about second SV, same format as fields 4 through 7
12–15	Information about third SV, same format as fields 4 through 7
16–19	Information about fourth SV, same format as fields 4 through 7
20	The checksum data, always begins with *

PJT**Projection type**

An example of the GSV message string is shown below. [Table C.10](#) describes the message fields.

\$PTNL,PJT,NAD83(Conus),California Zone 4 0404,*51

Table C.10 PJT message fields

Field	Meaning
0	Message ID \$PTNL
1	Coordinate system name (can include multiple words)
2	Projection name (can include multiple coordinates)

PTNL,GGK

Time, Position, Position Type, DOP

An example of the PTNL,GGK message string is shown below. [Table C.11](#) describes the message fields.

```
$PTNL,GGK,453049.0,0,3728.455440850,N,12215.253291068,W,3,9,2.0,EHT35.7424,M*
```

Table C.11 PTNL,GGK message fields

Field	Meaning
0	Talker ID \$PTNL
1	Message ID GGK
2	UTC time of position fix, in hhmmss.ss format. Hours must be two numbers, so may be padded, for example, 7 is shown as 07.
3	UTC date of position fix, in ddmmyy format. Day must be two numbers, so may be padded, for example, 8 is shown as 08.
4	Latitude, in degrees and decimal minutes (dddmm.mmmmmmm)
5	Direction of latitude: N: North S: South
6	Longitude, in degrees and decimal minutes (dddmm.mmmmmmm). Should contain three digits of ddd.
7	Direction of longitude: E: East W: West
8	GPS Quality indicator: 0: Fix not available or invalid 1: Autonomous GPS fix 2: RTK float solution 3: RTK fix solution 4: Differential, code phase only solution (DGPS) 5: SBAS solution – WAAS, EGNOS, MSAS 6: RTK float or RTK location 3D Network solution 7: RTK fixed 3D Network solution 8: RTK float or RTK location 2D in a Network solution 9: RTK fixed 2D Network solution 10: OmniSTAR HP/XP solution 11: OmniSTAR VBS solution 12: Location RTK solution 13: Beacon DGPS
9	Number of satellites in fix
10	Ellipsoidal height of fix (antenna height above ellipsoid). Must start with EHT.
11	M: ellipsoidal height is measured in meters
12	The checksum data, always begins with *

Note – The PTNL,GGK message is longer than the NMEA-0183 standard of 80 characters.

RMC Position, Velocity, and Time

The RMC string is shown below, and [Table C.12](#) describes the message fields.

\$GPRMC,123519,A,4807.038,N,01131.000,E,022.4,084.4,230394,003.1,W*6A

Table C.12 GPRMC message fields

Field	Meaning
0	Message ID \$GPRMC
1	UTC of position fix
2	Status A=active or V=void
3	Latitude
4	Longitude
5	Speed over the ground in knots
6	Track angle in degrees (True)
7	Date
8	Magnetic variation in degrees
9	The checksum data, always begins with *

VTG **Track Made Good and Speed Over Ground**

An example of the VTG message string is shown below, and [Table C.13](#) describes the message fields.

```
$GPVTG,,T,,M,0.00,N,0.00,K*4E
```

Table C.13 VTG message fields

Field	Meaning
0	Message ID \$GPVTG
1	Track made good (degrees true)
2	T: track made good is relative to true north
3	Track made good (degrees magnetic)
4	M: track made good is relative to magnetic north
5	Speed, in knots
6	N: speed is measured in knots
7	Speed over ground in kilometers/hour (kph)
8	K: speed over ground is measured in kph
9	The checksum data, always begins with *

ZDA UTC Day, Month, And Year, and Local Time Zone Offset

An example of the ZDA message string is shown below, and [Table C.14](#) describes the message fields.

\$GPZDA,172809,12,07,1996,00,00*45

Table C.14 ZDA message fields

Field	Meaning
0	Message ID \$GPZDA
1	UTC
2	Day, ranging between 01 and 31
3	Month, ranging between 01 and 12
4	Year
5	Local time zone offset from GMT, ranging from 00 through ± 13 hours
6	Local time zone offset from GMT, ranging from 00 through 59 minutes
7	The checksum data, always begins with *

Fields 5 and 6 together yield the total offset. For example, if field 5 is -5 and field 6 is $+15$, local time is 5 hours and 15 minutes earlier than GMT.

Glossary

almanac	A file that contains orbit information on all the satellites, clock corrections, and atmospheric delay parameters. The almanac is transmitted by a GNSS satellite to a GNSS receiver, where it facilitates rapid acquisition of GNSS signals when you start collecting data, or when you have lost track of satellites and are trying to regain GNSS signals. The orbit information is a subset of the ephemeris / ephemerides data.
base station	Also called a <i>reference station</i>. A base station is a GNSS antenna and receiver positioned on a known location specifically to collect data for differential correction. Base data needs to be collected at the same time as you collect data on a rover unit. A base station can be a permanent station that collects base data for provision to multiple users, or a rover unit that you locate on known coordinates for the duration of the datalogging session.
broadcast server	A broadcast server is an Internet server that manages authentication and password control for differential correction sources such as VRS networks, and relays corrections from the source that you select. An NTRIP server is an example of a broadcast server.
carrier	A radio wave having at least one characteristic (such as frequency, amplitude, or phase) that can be varied from a known reference value by modulation.
carrier frequency	The frequency of the unmodulated fundamental output of a radio transmitter. The GNSS L1 carrier frequency is 1575.42 MHz. The L2 carrier frequency is 1227.6 MHz.
carrier phase	Carrier phase is the time taken for the L1 or L2 carrier signal generated by the satellite to reach the GNSS receiver. Measuring the number of carrier waves between the satellite and receiver is a very accurate method of calculating the distance between them.
cellular modem	A wireless adaptor that connects a laptop computer or field computer to a cellular phone system for data transfer or real time corrections. Cellular modems, which contain their own antennas, use Bluetooth wireless technology or plug into a PC Card slot or into the USB port of the computer and are available for a variety of wireless data services such as GPRS
CMR	(Compact Measurement Record)
CMR+	A real-time message format developed by Trimble for broadcasting corrections to other Trimble receivers. CMR format is a more efficient alternative to RTCM correction messages, but is not supported by all non-Trimble receivers.
datum	A datum is a mathematical model of the earth's surface. World geodetic datums are typically defined by the size and shape of an ellipsoid and the relationship between the center of the ellipsoid and the center of the earth. Because the earth is not a perfect ellipsoid, any single datum will provide a better model in some locations than others. Therefore, various datums have been established to suit particular regions. For example, maps in Europe are often based on the European datum of 1950 (ED-50). Maps in the United States are often based on the North American datum of 1927 (NAD-27) or 1983 (NAD-83). All GNSS coordinates are based on the WGS-84 datum surface.

datum transformation	A datum transformation defines the method and parameters that are used to transform the coordinates of a point defined in one datum to coordinates in a different datum. Trimble software supports several methods of datum transformation including Seven-Parameter, Three-Parameter (also referred to as Molodensky), and grid-based transformations. Typically, you use datum transformations to convert data collected in terms of the WGS-84 datum using GNSS methods onto datums used for mapping purposes in individual regions and countries.
deep discharge	Withdrawal of all electrical energy to the end-point voltage before the cell or battery is recharged.
differential correction	Differential correction is the process of correcting GNSS data collected on a rover with data collected simultaneously at a base station. Because the base station is on a known location, any errors in data collected at the base station can be measured, and the necessary corrections applied to the rover data. Differential correction can be done in real time, or by postprocessing after the data has been collected.
DOP	Dilution of Precision. A measure of the quality of GNSS positions, based on the geometry of the satellites used to compute the positions. When satellites are widely spaced relative to each other, the DOP value is lower, and position accuracy is greater. When satellites are close together in the sky, the DOP is higher and GNSS positions may contain a greater level of error. PDOP (Position DOP) indicates the three-dimensional geometry of the satellites. Other DOP values include HDOP (Horizontal DOP) and VDOP (Vertical DOP), which indicate the accuracy of horizontal measurements (latitude and longitude) and vertical measurements respectively. PDOP is related to HDOP and VDOP as follows: $PDOP^2 = HDOP^2 + VDOP^2$
dual-frequency receiver	A type of receiver that uses both L1 and L2 signals from GPS and GLONASS satellites. A dual-frequency receiver can compute more precise position fixes over longer distances and under more adverse conditions because it compensates for ionospheric delays.
EGNOS	European Geostationary Navigation Overlay Service. A satellite-based augmentation system (SBAS) that provides a free-to-air differential correction service for GNSS. EGNOS is the European equivalent of WAAS , which is available in the United States.
elevation mask	The angle below which the receiver will not track satellites. Normally set to 10 degrees to avoid interference problems caused by buildings and trees, atmospheric issues, and multipath errors.
ellipsoid	An ellipsoid is the three-dimensional shape that is used as the basis for mathematically modeling the earth's surface. The ellipsoid is defined by the lengths of the minor and major axes. The earth's minor axis is the polar axis and the major axis is the equatorial axis.
ephemeris / ephemerides	A list of predicted (accurate) positions or locations of satellites as a function of time. A set of numerical parameters that can be used to determine a satellite's position. Available as broadcast ephemeris or as postprocessed precise ephemeris.
epoch	The measurement interval of a GNSS receiver, for example, a GNSS position may be calculated every second.

feature	A feature is a physical object or event that has a location in the real world, which you want to collect position and/or descriptive information about. Features can be classified as points, lines, or areas. For example, a road sign is a point feature, a road is a line feature, and a park is an area feature.
field computer	In the GPS Pathfinder ProXRT receiver documentation, a field computer is any portable computer such as a handheld device, a laptop, or a Tablet PC running the GNSS field software.
firmware	The program inside the receiver that controls receiver operations and hardware.
GLONASS	Global Orbiting Navigation Satellite System. GLONASS is a Soviet space-based navigation system comparable to the American GPS system. The operational system consists of 21 operational and 3 non-operational satellites in 3 orbit planes.
GNSS	Global Navigation Satellite System. Types of GNSS include GPS and GLONASS.
GSO	General Serial Output Format. A Trimble proprietary message format.
HDOP	Horizontal Dilution of Precision. HDOP is a DOP value that indicates the accuracy of horizontal measurements. Other DOP values include VDOP (vertical DOP) and PDOP (Position DOP). Using a maximum HDOP is ideal for situations where vertical precision is not particularly important, and your position yield would be decreased by the vertical component of the PDOP (for example, if you are collecting data under canopy).
H-Star technology	H-Star technology is a Trimble-patented technology allowing the collection of high accuracy GNSS data. A GNSS receiver that has H-Star technology logs L1 data or, if used with an external dual-frequency antenna, logs L1 and L2 data. Real-time H-Star technology uses corrections from an external source to provide decimeter accuracy in the field. Postprocessed H-Star technology uses base data from multiple base stations to obtain better accuracy for the collected data once back in the office.
International Terrestrial Reference Frame	(ITRF) A reference frame defined by the International Earth Rotation Service (IERS), with its origin at the Earth's center of mass. The WGS-84 datum is aligned with the current realization of ITRF, ITRF 2000 (also called ITRF00).
L1	The primary L-band carrier used by GPS and GLONASS satellites to transmit satellite data. The frequency is 1575.42 MHz. It is modulated by C/A code, P-code, or Y-code, and a 50 bps navigation message.
L2	The secondary L-band carrier used by GPS and GLONASS satellites to transmit satellite data. The frequency is 1227.6 MHz. It is modulated by P-code or Y-code, and a 50 bps navigation message.
MSAS	MTSAT Satellite-Based Augmentation System. A satellite-based augmentation system (SBAS) that provides a free-to-air differential correction service for GNSS. MSAS is the Japanese equivalent of WAAS , which is available in the United States.
multipath	Interference, similar to ghosts on an analog television screen, that occurs when GNSS signals arrive at an antenna having traversed different paths. The signal traversing the longer path yields a larger pseudorange estimate and increases the error. Multiple paths can arise from reflections off the ground or off structures near the antenna.
NAD-27	North American Datum of 1927. A horizontal datum employing the Clarke 1866 ellipsoid . Height values of this era are expressed in NGVD (National Geodetic Vertical Datum) of 1929.

NAD-83	North American Datum of 1983. A horizontal datum employing the GRS-80 ellipsoid . The original realization of NAD-83 was almost identical to WGS-84. The current realization NAD-83 (CORS96) differs from WGS-84 by up to a meter.
NMEA	National Marine Electronics Association. NMEA-0183 defines the standard for interfacing marine electronic navigational devices. This standard defines a number of 'strings' referred to as NMEA sentences that contain navigational details such as positions.
NTRIP	(Networked Transport of RTCM via Internet Protocol) NTRIP enables the streaming of DGPS or RTK correction data via the Internet. Data is usually received using a modem and/or a cellphone. An NTRIP server is an Internet server that manages authentication and password control for differential correction sources including base stations and VRS networks , and relays corrections from the source that you select. An NTRIP server can be accessed by a number of users at the same time.
OmniSTAR	The OmniSTAR service allows the use of new generation dual-frequency receivers with the OmniSTAR service. There are three levels of OmniSTAR service available: VBS (Virtual Base Station) for sub-meter operations; OmniSTAR XP for consistent decimeter service (< +/- 20 cms) worldwide; and OmniSTAR HP (High Performance) for horizontal accuracy better than 10cms. The HP/XP service does not rely on local reference stations for its signal, but utilizes a global satellite monitoring network. For GLONASS corrections, G2 is an optional service to HP and XP.
PDOP	PDOP (Position DOP) indicates the three-dimensional geometry of the satellites. Other DOP values include HDOP (Horizontal DOP) and VDOP (Vertical DOP), which indicate the accuracy of horizontal measurements (latitude and longitude) and vertical measurements respectively. PDOP is related to HDOP and VDOP as follows: $PDOP^2 = HDOP^2 + VDOP^2$ Using a maximum PDOP value is ideal for situations where both vertical and horizontal precision are important.
postprocessing	Postprocessing is the processing of satellite data after it has been collected, in order to eliminate error. This involves using computer software to compare data from the rover with data collected at the base station.
real-time differential GPS	Also known as <i>real-time differential correction</i> . Real-time differential GPS is the process of correcting GNSS data as you collect it. Corrections are calculated at a base station and then sent to the receiver through a radio link. As the rover receives the position it applies the corrections to give you a very accurate position in the field.
rover	A rover is any mobile GNSS receiver that is used to collect or update data in the field, typically at an unknown location.
RTCM	Radio Technical Commission for Maritime Services. A commission established to define a differential data link for the real-time differential correction of roving GNSS receivers. There are three versions of RTCM correction messages. All Trimble GNSS receivers use Version 2 protocol for single-frequency real-time differential corrections. Carrier phase corrections are available on Version 2, or on the newer Version 3 RTCM protocol, which is available on certain Trimble dual-frequency receivers. The Version 3 RTCM protocol is more compact.

SBAS	Satellite-Based Augmentation System. SBAS is based on differential GNSS, but applies to wide area (WAAS/EGNOS and MSAS) networks of reference stations. Corrections and additional information are broadcast via geostationary satellites.
signal-to-noise ratio	SNR. The signal strength of a satellite is a measure of the information content of the signal, relative to the signal's noise. The typical SNR of a satellite at 30° elevation is between 47 and 50 dBHz.
skyplot	The satellite skyplot confirms reception of a differentially corrected GNSS signal and displays the number of satellites tracked by the GNSS receiver, as well as their relative positions.
SNR	See signal-to-noise ratio .
SSF	(Standard Storage Format) A Trimble file format. SSF files store GNSS data from a Trimble GNSS receiver. Usually these files have the filename extension .ssf. A corrected SSF file has a .cor or .phs extension; an SSF file created by importing data has the extension .imp.
tracking	The process of receiving and recognizing signals from a satellite.
UTC	Universal Time Coordinated. A time standard based on local solar mean time at the Greenwich meridian.
velocity	Velocity is essentially a measure of speed that takes into account direction of travel as well as the distance traveled over a period of time.
VRS network	A VRS network consists of GNSS hardware, software, and communication links. It uses data from several base stations to provide corrections to roving receivers that are more accurate than corrections from a single base station. Unlike other real-time correction sources, using corrections from a VRS network requires two-way communication between the VRS network and the roving receiver. The roving receiver must send its position to the server, so that the server can calculate corrections for that position, and select the closest base station if necessary. The server generates a unique virtual reference station for each roving receiver that connects to it.
WAAS	Wide Area Augmentation System. WAAS was established by the Federal Aviation Administration (FAA) for flight and approach navigation for civil aviation. WAAS improves the accuracy and availability of the basic GNSS signals over its coverage area, which includes the continental United States and outlying parts of Canada and Mexico.
WGS-84	WGS-84 is an abbreviation for World Geodetic System 1984. WGS-84 has superseded WGS-72 as the datum used by GNSS since January 1987. The WGS-84 datum is based on the ellipsoid of the same name.

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